Learning to think, thinking to learn: Dispositions, Identity and Communities of Practice.

A comparative study of six N.Z. farmers as practitioners.

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Abstract

The aim of this research is to explore the question of how farmers learn, in constructing knowledge both in and for practice. It seeks to identify how they gain new ideas, make changes, develop to a level of expertise and who and what contribute to this process.

The rapidity of change in a high tech environment, combined with globalisation, the new economy and the knowledge age, means that farmers are living their lives in 'fast forward' mode. There is so much new technology, research and development available that the ability to identify information relevant to a particular farming practice and to process it to knowledge is an increasing challenge.

Six central South Island (N.Z.) farmers were selected purposively as case studies. The range of case profiles provides for comparison and contrast of the relative importance of formal qualifications, differences between sheep/beef farmers and dairy farmers, levels of expertise, age and experiences. The self-rating of the farmers enables a comparison of lower and higher performers, identifying characteristics which enable insight into why some farmers consistently lead new practice and why others are reluctant followers.

The research is qualitative in design and approached from a constructivist and interpretive paradigm. Socially and experientially based, it seeks to understand the experiences of the subjects through in-depth interviews and observations.

This study identifies farmers as social learners although working independently, in relative geographical isolation and often, social isolation. It concludes that these farmers learn through participation in the practice of farming. This practice includes a constellation of communities of practice, which may be resource-rich or resource-poor, depending on the range and depth of the farmer's involvement. Through full and committed participation in these practice communities and associate constellations, the practitioner's identity evolves, encouraging new practices, ideas and innovation. This study emphasises that expertise is not a permanent state but requires evolving identity, knowledge and dispositional ability; for maintenance and growth within a culture of practice.

Emergent grounded theory suggests that dispositional knowledge underpins construction and use of all knowledge; that construction and use of high-order propositional and procedural knowledge requires higher-order dispositional knowledge and that mastery is developed through evolving identity, dispositions, leadership and learning, socioculturally constructed through resource-rich constellations of communities of practice.

Keywords: dispositions; communities of practice; identity; novice; mastery; propositional; procedural; knowledge; knowing in practice; grounded theory; farmers; learning; sociocultural.

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  To adapt an old Irish blessing: –

  > *May the wind be always at your back; may the sun shine on your faces **and** on your farms; may the rains come regularly; may the grass grow vigorously and may your lives be rewarded with health, happiness and plenty of the 'old folding stuff.'*

  I hope and trust that this research is of benefit to *our* industry, the farming community including those involved in research and development, advisory, education and training groups, and many others.

  Jan Allan
  August 2002

Glossary

Apprenticeship: A process of guided, everyday learning-in-practice where a newcomer or novice learns through engaging and participating in a committed relationship with a master within in a community of practice. It may be 'formal' or 'informal' but requires empowering, transparent, full and legitimate access to a culture of practice with reciprocal qualities.

Community of practice: Is a set of relations among persons, activity and culture, which provides interpretive support for negotiating meaning and evolving identity, through legitimate participation.

Culture: Culture is a set of beliefs, traditions, myths, ways of thinking, speaking and doing, which characterises the way of life or behaviour of a given group of people (Kearns & Papadopoulos, 2000).

Culture of practice: Is 'understood social-knowledge' developed through everyday experience; immersion, legitimate access and participation in sociocultural communities - involves walk, talk and work.

Dispositional knowledge: Comprises intentional and mindfully directed identities, values, attitudes, interest and characteristics that enable use of knowledge. It enables use of propositional and procedural knowledge, good thinking and good practice.

Emerging master: Is a *journeyfolk*, progressing from novice towards mastery, through social co-participation within a community of practice.

Expert: An expert is a person who has extensive skill or knowledge in a particular field.

Farmer: For the purpose of this study, farmer refers to a person who either partially or wholly has the responsibility for the day-to-day management of a farm. A farmer may be either male or female. He/she may be a landowner, farm manager, sharefarmer or leasee.

Farming: Farming refers to all aspects of the farming business including science, education, extension and farm management.

Field-day: A participatory day where specific farming topics (often R & D) and innovative practices are observed and discussed in a contextual working environment.

Full membership: Requires a social process of becoming a full participant in a sociocultural practice. It implies emergent mastery of new tasks,

activities and functions, with new understandings in relation to the context in which they have meaning. It subsumes the learning of knowledgeable skills and is an evolving form of membership.

Full Participation: Consists of a diversity of relations required for recognised full membership in a community of practice and associate practices. It incorporates a culture of practice.

Higher Performer (HP): For the purpose of this research, refers to a farmer rated as being in the top 30% of farmers in his/her farming type.

Identity: Is the way a person understands and views him/herself and is viewed by others; a perception of self, which is fairly constant. Identity, knowing and social membership entail one another.

Journeyfolk: A term entailing the social learning process involved in 'becoming' and 'knowing' through a journey from novice towards mastery.

Knowledge: Knowledge is the product of learning and may be practical (procedural), propositional (declarative), or dispositional. It may consist of lower-order or higher-order forms, in depth of understanding and the ability to make conceptual links and to see possibilities. Information is not knowledge unless it is processed through reflection, constructing meaning.

Learning: Learning refers to the process of constructing knowledge.

Learning Culture: A learning culture is a culture that values and assimilates continual learning into a way of being.

Legitimate Peripheral Participation (LPP): Describes a set of relations between newcomers, old-timers, activities, identities, artefacts and communities of knowledge and practice. It requires engagement in social practice with commitment, transparency, empowerment and legitimate access. As a reciprocal relationship between the person and the practice, it can be a source of power or powerlessness.

Lower performer (LP): For the purpose of this study, refers to a farmer rated as being in the bottom 40% of farmers in his/her farming type.

Master: One who has made the culture of practice their own offering exemplars foe novices and journeyfolk in talk, walk and work; an actively evolving, not permanent, identity.

Monitor Farm: In this study refers to a sheep and beef farm and farm family, chosen for funding, (from levies to Meat NZ and Woolpro), for farm advisory. It consists of a facilitated programme, which involves the input of local community farmers, into improving practice of the privately owned

farming enterprise. The objective is to present 'good practice' (as the results of the monitoring), to the farming community at large.

Newcomer: A term relative to *old-timer;* a newcomer is one newly entering a sociocultural community of practice, who establishes an identity for practice through engagement and participation with journeyfolk and masters.

Old-timer: A term that recognises those with experience, expertise and sociocultural knowledge, constructed as a result of a process of 'becoming,' through the journey from novice to master within a community of practice. Its not necessarily related to age, although normally an old-timer has vast experience, accumulated over a lengthy period.

'Outsider expert:' For the purpose of this study refers to experts, other than farmers themselves, e.g. consultants or providers, who are experts in their own different fields.

Partial Participation: Is the process of participating in a connected, peripheral role in a community of practice with the **potential** for dynamic access to sources of understanding, through growing involvement - not fully participant.

Practice: Refers to the exercise of a set of actions requiring knowledge, skill and mastery.

Procedural Knowledge: (knowing how) Practical knowledge or skill with automaticity, achieved through compilation and practice.

Profession: Profession and professionalism refer to an occupation requiring great competence and expertise, recognising a depth of *knowledge* as well as skill.

Propositional knowledge (also called declarative knowledge): (knowing what, that, about). Facts from texts and instructions required to develop effective knowledge of procedures. Requires recall from memory until proceduralised to automaticity.

Trade: Trade refers to an industry that is based on a craft requiring practical skill.

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Introduction

1.1 General Introduction

This study seeks to explore how farmers learn in constructing knowledge; how they gain new ideas, make changes, develop to a level of expertise, and who and what contribute to this process. It is approached from the perspective of farmers as researchers in their own right, gaining knowledge. Schön (1983) recognised this 'kind of rigor' and 'experimentation' as knowledge-in-action and the action of a reflective practitioner. This present study proposes that as farming moves along the continuum from lifestyle, (i.e. valuing the 'way of life' as the dominant value of farming) to a paradigm where business and financial results are viewed as almost exclusive to intrinsic rewards, there needs to be a corresponding and increasing move from a trade-based skill culture to a professional-based learning culture.

This chapter outlines the relevancy of the research issue. The research question is stated and the structure of the thesis report is presented.

The structure of the chapter has the following six subsections:

1.1 General Introduction
1.2 Relevance of the research issue
1.3 Personal interest
1.4 The knowledge age – fact or fiction
1.5 Research question
1.6 Thesis report outline

'Fast forward' in the 21st Century

The rapidity of change in a high tech environment, combined with globalisation, the New Economy and the Knowledge Age (Allee, 1997; Sveiby, 1999; Drucker, 2000; Senge, 1998; Allee, 1999; Witten-Hannah, 2001) means that farmers are living their lives in 'fast forward' mode. There is so much new technology, research and development available (Stantiall & McDiarmid, 2000; Hamilton, 1995; Scoones & Thompson, 1994) that the ability to identify information relevant to a particular farming practice and to process it into knowledge, is an increasing challenge.

Farming in New Zealand has no strong tradition or cultural value of farming qualifications, (Allan, 2000) with farmers more commonly renowned for their ingenuity, inventiveness and stoic, hardworking attitudes. How are they making the transition from brawn to brain; from working hard to working smart? What are the implications of this perceived change?

1.2 Relevance of the research issue

In conducting a background or contextual review of the proposed research area of how farmers learn, the majority of the literature identified was from Australia with lesser contributions from the USA, Netherlands and New Zealand. Thus, the first major discovery was that New Zealand is behind in this area of research although, in talking to key informants there is a perception that work in this area is becoming more common. Fortunately, New Zealand's rural culture, while not being the same as that of Australia, at least has areas of strong similarity, so that such reports have a feeling of familiarity for me as a rural person and as a farmer. This infers a definite, although qualified, relevance of Australian research to this New Zealand study.

Most research has been conducted by those directly involved in agricultural research or in the diffusion of environmental or biodiversity issues. Their desire to increase awareness and adoption of sustainable practices has made them leaders in the field of researching farmers and learning. Much of this research though, has the objective of

furthering the effectiveness and efficiency of the relevant organisations. No research was identified as being sought from the viewpoint of farmers understanding their processes and behaviours towards successful learning, so that they may understand themselves and possibly, actively pursue an individual professional development programme either formally or informally.

It is timely for New Zealand research to be added to the Australian interest in farmer learning. In preparation for this research, I have contacted many agricultural science and educational organisations that have expressed their commitment to improving their approach to learning programmes. Many refer to a move from Transfer of Technology (ToT), a tutor-centred teaching paradigm, to extension, a learner-centred learning paradigm. They describe this as a move from passive learning to interactive, participatory learning, suggesting a move from the behavioural model to a constructivist one.

Farming is still New Zealand's major export earner and thus farmers are a large marketable body for increased formal, informal and non-formal learning, which creates a competitive environment for education and training providers. This encompasses the role of institutions like Massey and Lincoln Universities (formal education), AgResearch (from science to extension), Dexcel (dairy farming extension), Farm Consultants (informal and non-formal learning), Polytechnics and private providers (formal education). The current research area is vital knowledge to enable such institutions to provide a meaningful, relevant and authentic service valued by the farming community. More importantly it is of value for farmers to have answers to the question of how they learn and what assists in that process so that they can understand themselves and learn more efficiently and more effectively. This study contributes to insight that will assist in the understanding of family farming members and other staff members, in their progression from novice to master, as they are inducted into a new learning and work culture (Lave, 1990; Lave & Wenger, 1991; Brown, Collins & Duguid, 1989). It is predicted that learning fast will be a major indicator of farm performance for the 21st Century (Parker, 2000).

In order to look at the future of farmers and farming, it is necessary first to understand how farmers learn and how they construct their knowledge.

Qualifications are not the sole requirement for competing and succeeding in the present environment but a range of skills and a depth of knowledge that may be gained through either 'formal' or 'informal' learning (or a combination of sources), are required. It is considered that innovation is likely to be essential to the future of farming (Parker, 2000). This supports the views of other business commentators (Burton-Jones, 1999) who identify a need for continuous knowledge acquisition and knowledge creation, as vital to the 21st Century.

In a related study of situated learning, Lave (1990) refers to studying apprenticeship and adult learning-in-practice, in order to help understand how novices (of any age) learn. Insights from this present study of farmers may open the way for research into how young farm employees learn. Until the learning of farmers is better understood it is difficult to understand their requirements and to develop an excellence in workplace learning for all farming people. Kearns & Papadopoulos (2000, p.4) state that:

> building a *learning culture* is not a soft option (but) ... an imperative for economic success, social cohesion and quality of life in the new world of the twenty-first century.

This present study seeks to explore whether New Zealand farmers and farming are poised to lead the way in this challenge to a new professionalism and cultural evolution.

1.3 Personal interest

While my background is in both farming (I've farmed in partnership for an extensive number of years) and adult learning, my interest in this proposed topic arose while I was working in agricultural industry training. I visited farmers and their staff members to advise on, coordinate and moderate training. Invariably I was captivated by the number of very competent farmers with low or no formal qualifications, who were running very substantial businesses. It raised the question of how they had learned their knowledge and skills and why some were better learners than others. What did they do differently?

There was also an area of conflict when those involved in training, 'outsider experts', often appeared ignorant of the needs of farmers and the culture of farming. They often disvalued the informal learning of farmers and were ignorant or disinterested in the issue of how farmers learn best. Consequently, relevancy was often inferior in training programmes for both farmers and their staff members. These 'outsider experts' and the New Zealand public generally, often presume farmers have *inherited* both their farm and their farming skill and knowledge. This assumption is an outdated view of the industry. This personal interest was further stimulated by the ITAG report (1999) and the current emphasis on a knowledge-based economy.

1.4 The knowledge age – fact or fiction?

New Zealand, as a pastoral economy, has a history of 'living off the sheep's back.' It has relied on agriculture for its revenue and an efficient farming industry has served several generations of New Zealanders well. Now with the loss of special status, as a colony of Britain, the end of the long boom from 1945 to1973 and the subsequent political and economic reforms of the 1980's, New Zealand is recovering from a prolonged period (1974 into the 1990's) of economic stagnation, high unemployment and increased indebtedness, with a subsequent lowered standard of living (Roper, 1997). With increasing global and technological influences, the traditional economy based on primary products, is being challenged regarding its ability to provide the level of growth required for the needs of the 21st Century. To maintain the desired standard of living, the call is being made (ITAG, 1999) for *knowledge-rich* industries to deliver the jobs and wealth required to become a knowledge economy.

ITAG (1999, p.1) consider that

> the foundation stones of the knowledge economy are human ingenuity and skill and a commitment to innovation through research and development.

While farmers are known historically for their ingenuity, skill and innovation, to remain significant in New Zealand's economy, according to this view, they need to

become knowledge-rich. This is predicted to be the first generation not to be valued for calloused hands and sweat on the brow but rather for ideas and innovation (Drucker, 1994). This concept is based on Romer's New Growth Theory, which differs from neo-classical economic theory, in recognising *knowledge* as the basis of capital rather than traditional capital and labour. Romer, according to the ITAG report, considers that technological developments lead to continuous innovation, which is the key to economic growth. ITAG (1999, p.4) states that for this growth to occur there needs to be "sufficient human capital" which they see as "*formal* education, training and on-the-job learning embodied in the workforce." Where does this leave New Zealand farmers and where do they fit into the future?

Whether the knowledge economy becomes fact, or merely a use of terms, remains to be seen. While this knowledge emphasis is being promoted as the new saviour, by many politicians, scientists and other commentators, this may not be anything new. The editors of the journal Daedalus, (Schön, 1983, p.6) discussed the "knowledge industry" in 1963, and John Kennedy in 1962 referred to a "second scientific revolution" producing a "knowledgeable society." This research recognises farmers and farming as a well developed knowledge-based industry although not recognised or authenticated as such.

1.5 Research Question

The research question is:

- How do farmers learn/construct knowledge, in and for practice?
  - Who and what contribute to this process?
  - What are possible implications for the development of a learning culture in New Zealand farming?

1.6 Thesis report outline

This thesis report is divided into 7 chapters. The chapters are presented as follows:

Chapter 2 provides a non-exclusive review of content literature and theoretical literature and discusses the position of literature in research. A full review of a cognitive approach to knowledge theory is presented, both as literature and as supplementary data.

Chapter 3 describes the research methodology applied in this study. Sampling, data generation and analysis techniques are outlined; case study and interview methods and grounded theory methodology are described in practice.

Chapter 4 presents the first part of the results and analyses. This chapter describes and explores the ontogenies of the cases studied. It introduces the reader to the 'real people' behind the cases. Direct quotes are used to support observations and interpretive analysis of data, in relation to theoretical perspectives.

Chapter 5 presents the second part of the results and analyses. This chapter analyses and discusses themes, patterns, and relationships emerging from data in relation to theoretical perspectives.

Chapter 6 extends the discussion of analysis from chapters 4 and 5. It discusses major findings in relation to theoretical perspectives and subsequent emerging theory is identified. Areas for further research are suggested.

Chapter 7 summarises findings, key points and emerging theory while major findings are elucidated and many historical assumptions challenged. Possible implications for farmers, and for farming as a learning culture, are outlined.

Chapter 2
Literature Review

2.1 Introduction

This chapter discusses the position of literature in research and summarises non-exclusively, content literature and theoretical literature, in relation to knowledge construction in and for practice. A full review of a cognitive approach to knowledge theory is presented, both as literature and as supplementary data.

The structure of the chapter has the following five subsections:

2.1.1 Position of literature in research

There are conflicting views regarding the importance of a literature review in preparation for conducting new research. Neuman (1997) considers the process of a literature review as essential, in order to gain familiarity with the current body of knowledge, show linkages to prior research, integrate and summarise what is known in the research area and to learn from others while stimulating new areas for study. Robson (1993, p.24) is more cautious about the importance of prior research when studying real world topics, as literature may be fragmentary. He does concede though, that an electronic search is important to "get a feel" for the subject while being aware of the trap of being "imprisoned by what others have done, into a particular way of looking at and investigating the topic." McCracken (1988, p.31) emphasises the importance of critical analysis of current literature that makes the investigator "the master, not the captive" of previous scholarship. Thus, the literature review is a "kind of qualitative analysis" searching out unconscious assumptions, helping define problems and aiding in the construction of interview questions.

In this present study, an extensive literature search was conducted, initially to gain familiarity with the current body of knowledge and to identify areas for new research focus. While current literature was influential in preparation of the initial interview schedules, once data was being generated, the literature that was compared to and integrated into analysis and discussion, was led by emerging themes and theory. This supports Strauss & Corbin's (1998, p.53) grounded theory approach. They state:

> The important point for the researcher to remember is that the literature can hinder creativity if it is allowed to stand between the researcher and the data. But if it is used as an analytic tool, then it can foster conceptualisation.

They see concepts derived from literature providing a source for making comparisons to data. Thus, literature becomes another set of data, which can enhance sensitivity.

My conduction of the literature review process encompassed all of these views. At times, I felt trapped by fragmentation as I gained familiarity with current literature but I have attempted to remain the master and not the captive of previous scholarship.

2.2 Content literature review

2.2.1 Introduction

As stated in Chapter 1, research into farmer learning is a relatively recent area of interest with Australia leading the way in both research conducted, availability and ease of access to research papers. There is some evidence that New Zealand is seeking to collect data on improving knowledge systems and effectiveness of Research and Development (R&D) as extension (Stantiall & McDiarmid, 2000).

2.2.2 Changing paradigms

Researchers have employed a wide range of approaches in investigating this broad topic. Several earlier far-reaching papers and reports (Carr, 1995; Hamilton, 1995) were written challenging work peers and readers to innovate new ways of approaching teaching and learning in the rural context. Hamilton described a clash, which he referred to as a paradigm war that had "the potential to split the team and cause the project to founder" (p.134). He suggested that scientists and extensionists were information poor and criticised the attitude that "farmers who are late adopters

are regarded as laggards," and perceived as irrational in their decision-making (p.11). His report somewhat reversed the ledger and may have contributed to changes in the late 90's.

2.2.3 Focuses of previous research

Much current research has been motivated by the desire to find a more effective means for farmers' learning through the diffusion and adoption of sustainable or new practices (Carr, 1995; Reeve & Black, 1998; Lacy, 1998; Vanclay et al., 1998). Others have focused on improving education for management or marketing skills (Kilpatrick & Johns, 1999; Kilpatrick & Rosenblatt, 1998; Kilpatrick, 1999). Many focused either partly or wholly on learning through group participation, (Reeve & Black, 1998; Carr, 1995, Bamberry et al., 1997) identifying an increasing significance of farmer-directed group learning as a means of increasing knowledge. With the growing emphasis on knowledge as a form of capital (Burton-Jones, 1999; Parker, 2000), learning how to learn has become as imperative for farmers, as for other business people.

2.2.4 Individual and social aspects of learning

Learning is considered by some (Salomon & Perkins, 1998; Billett, 1999; Lave & Wenger, 1991; Brown & Duguid, 1991; Wenger, 1998) to be a social process in that as we are social creatures we are also social learners (Salomon, 1999). For farmers who often work alone or in relatively isolated situations, there is a need for independence which develops independent learners 'on the job' and a tendency, possibly, towards individualism. Billett (1999) discussed work as social practice in which cognition is distributed or stretched across the social partners. While larger employing farmers have the opportunity to develop these rich interactions, many farming couples rely on each other for day to day social contact, which raises the question of where or how such farmers experience this important social aspect of learning. Maybe this explains in part the growth in farmer-directed groups, as a social environment other than families, is sought by farmers either consciously or

sub-consciously, to help them develop meaning and understanding in this current world of rapid change. Group learning has become more common for farmers, with an emphasis on experience and reflection (Roberts, K. 2000; Roberts, G. 1997) as a means of participatory learning; a social experience.

2.2.5 Formal, non-formal and informal learning

The distinction between formal, non-formal and informal learning is discussed in most research into farmers and their learning. Farmers probably due to their geographical, cultural and social situations, are considered practical people, perceived as learning mainly from trial and error i.e. experience. Several studies sought to correlate education with successful farming. The results depended on what value was put on informal and non-formal learning. Reeve & Black (1998) concluded that further education increased uptake of new practices while Kilpatrick (1997) concluded that farmers with *formal accredited* agricultural education were more profitable. Bamberry, Dunn & Lamont (1997) on the other hand, decided that there was

> little conclusive evidence of a strong relationship between formal farmer education, agricultural productivity and good farm management performance.

Buggie (1981), cited by Bamberry et al. (1997), argued that farmers' intelligence, knowledge and self-awareness were more significant factors for farm performance, than formal education. This research found that farm statistics, regarding the education of men as farmers, were incomplete as they "don't include education level of women [farm partners] and other family members involved on-farm" i.e. the total farm management team. Bamberry et al. (1997) emphasise the high level of informal education attainment of farmers, while recognising evidence that formal education levels are rising especially among young male farmers and among women. They conclude,

> farmers are not as poorly educated as statistics on their formal education suggest because of their practice of gaining much of their education informally (p. 11).

As stated formal education, or the perceived lack of such, has been investigated in several studies (Bamberry et al. 1997; Reeve & Black, 1998; Kilpatrick, 1997). These studies don't differentiate between low-level formal education (e.g. the equivalents of National Certificate level 2 or 4) and higher-level University degrees or Diplomas. Considering that the former is probably a lower level than some school leaver's qualifications, the comparison may not be valid. Synapse Consulting (1998) produced quantitative data on formal education which was quite intangible in conclusions with no assessment of gender or farmer input, thus of limited value for understanding social or cultural aspects of learning and formal education. This report was produced for a research organisation to help identify Research & Development priorities. This demonstrates caution in generalising when research is conducted for a very specific market or reason. Some of the research available has been completed by those with a vested interest in their findings, which may bias their project design. Indeed, it could be argued that all research has some level of bias and vested interest, which researchers and audiences need to reflect upon when writing or reading research reports.

2.2.6 The role of women

The role of women in the family farm business or farm workplace, is included in some studies. Reeve & Black (1998) recognised the importance of the farm family or farm team education, as opposed to the one individual i.e. the male farming partner. They found that "farmers who adopted practices were twice as likely to have a male or female partner who had participated in further education compared with farmers who had not." Reeve & Black (1998) also identified that the farming families demonstrating less traditional roles, within both the household and on-farm, increased women's participation in further education, which was a critical factor in the success of the farm performance. This could suggest the importance of heterogeneity within the farm household with the subsequent diversity contributing to the richness of social and cultural capital in the farm family.

The need for close communication between women on farms and their farming families or partners is identified as crucial for good farm management (Bryant,

1999). Bryant found that computers are only used as a mechanism for recording data and not analysis, unless the men have the keyboard skills or women collaborate with the men specifically for analysis – or where women are influential in farm management decision-making. This was seen as being related to an inside versus outside work attitude i.e. inside office work is not 'real' work and consequently more likely to be considered women's work. There are other possible explanations for this though, such as the possibility that farming males may favour gross motor skills and lack confidence in the use of certain fine motor skills. This would not be surprising considering many would have been attracted to farming because of its physical nature.

2.2.7 Sources of information

Other areas researched include the identification of main sources of information, with predominant sources varying greatly (Reeve, 1999; Bryant, 1999; Kilpatrick & Johns, 1999; Moore, 1990). Reeve (1999) identified accountants and weekly rural newspapers as the most common source of information while Bryant (1999) found that radio and other farmers were the predominant sources. In a previous study, (Allan, 1998) a wide range of sources of information were identified as contributing to construction of knowledge of a farmer, with the major influence being attitude and values; that described by Billett (1997a); Katz, (1993); Prawat, (1989); and Perkins et al., (1993) as dispositions for knowledge.

2.2.8 Computer usage

Computer ownership and usage (Bryant, 1999; Daniels & Woods, 1997; Nuthall & Benbow, 1999) has been studied, to identify how computers contribute to farmer knowledge and management practices. Generally, findings are that the main usage is for record keeping and word processing. These studies show limited use of the internet for gathering information directly related to farming, but the rapid growth of

internet development, knowledge and usage, may make these studies, although recent, already outdated.

Stubbs, Markham & Straw (1998) identified age, time allotment and interest in records/information as prerequisites for the use of computers, and the lack of farmer friendly equipment, cost/benefit and sheer volume of information, as deterrents to computer usage and more specifically to internet usage. They noted a high level of awareness among farmers, predicting that with resolution of perceived drawbacks, computers and internet usage will rival the present high usage by farmers, of the fax machine.

Current figures, (Timaru Herald, 07/08/01) state that 60% of farmers surveyed have internet access compared to a national average of 33%, with 52% of farmers using the internet as a business tool, including sourcing information and conducting research into topics. This supports the prediction of Stubbs et al. (1998) and their recognition of the high rate of uptake of previous technology by farming families being reflected in internet usage.

2.3 Relevant research and theory.

2.3.1 Social construction of learning

Much of the current literature on learning for work, (Billett, 1994; Salomon and Perkins, 1998; Brown, Collins & Duguid, 1989; Lave & Wenger, 1991), discusses how people construct knowledge, particularly in the workplace, through sociocultural and sociohistorical interaction. This supports social constructivist theory and Vygotsky's (1978) sociocultural approach to learning and development. Scaffolding may be an important role of farmer discussion groups and along with the sociocultural role, may add to explanations of their growth in popularity.

2.3.2 Situated learning

The integration of learning and the development of the 'know what' and the 'know how,' appear to be crucial to farming knowledge. According to situated cognition or situated learning theory, (Lave, 1990; Lave and Wenger, 1991; Wenger, 1998; 2000; Greeno et al., 1999) learning requires social interaction as participation in a *culture of practice*. Group participation may expand the *community of practice* (Lave and Wenger 1991; Wenger, 1998) of farmers, providing a practice community, in which they share understandings concerning what they are doing and what that means in their lives and for their practices.

There are conflicting views, depending on differing epistemological assumptions, of how much learning is *individual* as opposed to *social,* in construction. Salomon and Perkins (1998) support both individual and social aspects of learning while Brown and Duguid (1992) believe learning to be predominately socially based. Brown & Duguid propose that learners "steal" knowledge from those with more mastery, in an *apprenticeship mode,* that which Lave and Wenger (1991) refer to as legitimate peripheral participation (LPP). Brown and Duguid (1992) describe LPP as 'legitimate theft' while the learner is being *enculturated* in a *community of practice,* a social milieux and *culture of practice* (Lave and Wenger, 1991). In such practices, the social world provides scaffolding that differs in type, strength and versatility according to the dispositions, knowledge and skills of the *masters* (Lave & Wenger, 1991) or *experts* (Billett, 1993).

As discussed, farmers work in relative isolation, which can create independent, private, self-contained individuals. Brown and Duguid (1992) discuss isolation emerging from modern technologies and the corresponding need to access a "social periphery that can help support and make sense of use" (p.5). They also identify the importance of any decomposition of tasks to be relevant, and situated in the context of overall social practice. Thus, it is vital not to "fragment the social periphery." This may be occurring in larger farming practices as novice workers are often

expected to perform, with minimal sociocultural scaffolding. This may contribute to the problem of retaining farming staff, especially on large dairy farms. Billett (1993; 1994) supports the view of experts and learners co-participating in sociocultural environments, developing expertise while embedded in practices of culture and in a social context.

2.3.3 Passive to active learning

The paradigmatic move in agriculture from teaching to learning, transfer to participation, passive to active and individual to social, has emerged in recognition of local complexities. Scientists were frustrated by the lack of uptake or adoption of new practices that *they* thought were necessary for good practice (Scoones & Thompson (1994); Vanclay (1994); Pretty & Chambers (1994); Hamilton (1995). The resistance of farmers was often seen as an uneducated, ignorant response while farmers knew from their *local knowledge* that the practice or new technology did not fit their local complex situations. This created a scientist, farmer divide (Hamilton, 1995), which to some extent remains today (Parker 2000). Pretty and Chambers (1994) proposed new approaches and methods, with accompanying shifts in initiative, responsibility and action - a move from a hierarchical model to a new participatory approach. They proposed a move from the old professionalism with the assumption of a singular tangible reality, to a *new professionalism* with the assumption of multiple realities that are socially constructed. In this model, local people and 'outsider' professionals set priorities together. For this *new professionalism* to evolve, farmers need to become active participants with professional attitudes, accepting joint responsibility in contributing to the development and spread of new knowledge. Pretty and Chambers (1994, p.202) suggest this could be achieved through each person (farmer, scientist and extensionist) exercising "critical self- awareness and embracing error, (to) learn and improve, so that the new professionalism grows and gets better."

2.3.4 Tacit Knowledge

A farmer's tacit knowledge has not often been recognised as valid or real knowledge. This knowledge has been described by writers as being local, rural, indigenous or traditional. *Local Knowledge* (LK) (Richards, 1994) has a diversity of meanings. For some it is culturally particularised with localised beliefs, attitudes and understandings, while to others it is *indigenous technical knowledge* based on practical skills and knowledge, adapted to local complexities of environment and resources (Scoones & Thompson, 1994).

Rural Peoples' Knowledge (RPK) (Scoones and Thompson, 1994) is slowly gaining in legitimacy with extensionists and scientists. RPK, largely informal knowledge, has been regarded as "wrong" and "unscientific" requiring formal research and education to develop practice. Over recent years there has been a move to legitimising RPK, local knowledge and indigenous knowledge as a "valuable and under utilised resource" (p.17), which is increasingly adding to the body of knowledge. In this change of paradigm, farmers are not seen just as *adopters* or *rejectors* of technologies but as *originators* of technical knowledge and improved practices (p.18). This tends to add to an increasing legitimacy of farmers themselves as 'experts,' and to a growing acceptance, by 'outsiders', of their informal knowledge as legitimate knowledge. In this model, farmers who have "rich experience and good strategies in farming practices" are *experts* in agriculture (Winarto, 1994, p.153). This change in perception adds to the authenticity of farmer knowledge and to legitimacy in the claim to a new professionalism. It is unclear though, how widespread this change in attitude exists in reality. It may still be merely a possibility or a case of actions not matching words.

2.4. Learning as the process of constructing knowledge

During the generation of data, there emerged a need to complete a review of knowledge theory from a constructivist approach, in order to understand this process for analysis. Theory evolved in combination with emerging data and emerging

themes and linkages. Thus, the full and extended review presented is a result of both a review of literature and supplementary data generation.

2.4.1 Cognitive approach to learning

In studying concepts of learning, much educational and workplace-learning research and discussion, centres on what is *learning* and what is *knowledge*. The question of how different working cultures, learning from different knowledge bases, approach learning, is a relatively new field of study.

Goldstein (1993, p.105) in discussing cognitive approaches to knowledge construction, builds on Glaser's (1990) idea that, "learning involves a series of stages and that different types of learning might be important during these stages." He cites Anderson (1987) referring to the first stage of learning as declarative learning, that which "involves obtaining factual knowledge about a task without having learned the conditions of applicability" (p.105). This relies on memory of learned facts and instructions. According to Anderson's (1982) ACT model (a theory of cognitive modelling), this *declarative knowledge* (knowing what) becomes *proceduralised knowledge* (knowing how), by a transitional process of *knowledge compilation*.

Knowledge compilation (Figure 2.1), according to Anderson (1982, p.383) comprises two sub-processes:

1. Composition – sequential productions collapsed into a single production.
2. Proceduralisation – application and use of knowledge, no longer requiring declarative information to be retrieved into working memory.

This process enables speed, automation and accuracy of knowledge for application.

2.4.2 Declarative or propositional knowledge and its relationship to procedural knowledge

Miller (1999) and Sveiby (1999) theorise that information has little or no value unless knowledge is created from it. They argue that propositional knowledge is merely stored information unless it is processed to a usable form. The actual *reflection* upon and subsequent *use* of declarative or propositional knowledge (facts from texts and instructions) is required, to develop effective knowledge of procedures.

According to Anderson (1982), declarative knowledge has a very high attention demand and needs to be encoded and interpreted, often with verbalisation, to retain it in memory. It may be used interpretively, which is an inefficient use of time and memory or *compiled*, to accelerate learning and achieve automaticity "freeing the memory for processing of new knowledge" Goldstein (1993, p.105). Thus this process of proceduralisation involves "the application and use of knowledge to do something."

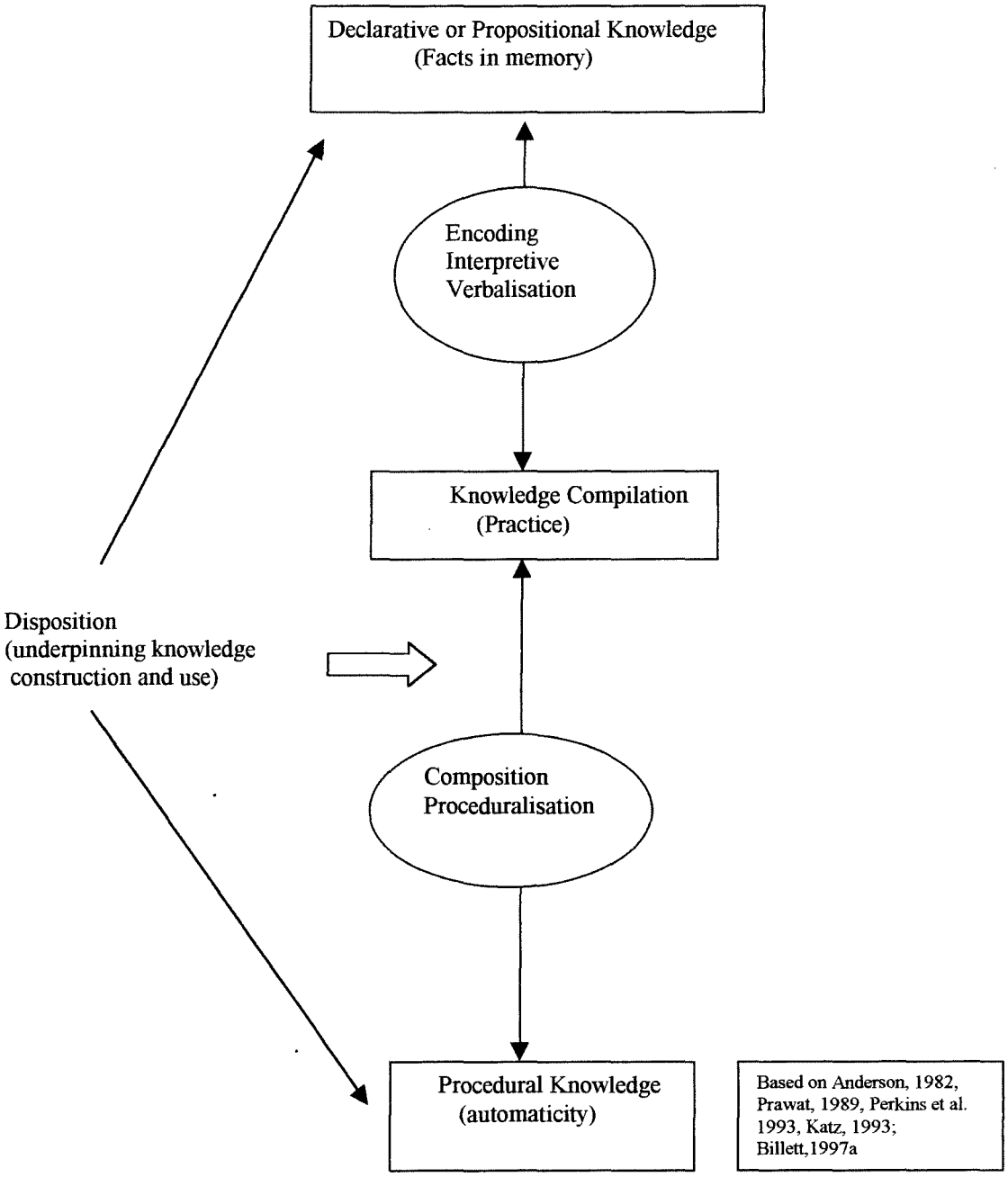
Knowledge compilation (Goldstein, 1993, p.107) involves practice, "trying out methods and using the knowledge gained (while) as learning continues to occur, the attentional demands of the task are reduced." Through such practice, procedural knowledge is constructed, automating the skill, which then requires minimum attention, resulting in rapidity and competence. As the learner fills in gaps in their knowledge, their capability grows with a transition from novice level towards expertise.

Goldstein (p.113) cites Gitomer (1988), who found that "the experts' declarative knowledge was more complete and well organised and they were also better at selecting strategies (procedural knowledge)." Gitomer's study implies that a trainee (novice) may have difficulty with a task either due to lack of access to procedural knowledge (knowing how to do) or due to lack of access to declarative knowledge (knowing what to do). Anderson, (1982, p.390) considered that errors in practice are

more likely to occur when the conversion from procedural knowledge to declarative knowledge is occurring i.e. when neither a novice nor an expert, but a practicing learner. He suggested *gradual* compilation might reduce the probability of such practice errors occurring while increasing productivity. Anderson (1982) stressed that the reverse also applied with interpretive use of declarative knowledge being less productive than when proceduralised, which may also lead to errors in practice. Through use, both declarative and procedural knowledge become automated as understanding grows and skills are practiced.

Figure 2.1 depicts the two-way process of either proceduralising knowledge through practice or conceptualising procedural knowledge through reflection on practice. The role of disposition in knowledge construction as discussed in section 2.4.4 is depicted (Figure 2.1) as underpinning knowledge construction.

Figure 2.1 **Cognitive Approach to Learning**



- This process may be reversed i.e. procedural knowledge practiced and reflected on may lead to deeper conceptual understanding (propositional knowledge).

2.4.3 Conceptual knowledge

Billett (1998, 1994, 2001) refers to declarative knowledge as *propositional knowledge* which includes *conceptual knowledge* (Billett, 2001). Prawat (1989) refers to conceptual knowledge as knowledge rich in relationships. This enables experts to make stronger links and relationships between concepts thus organising their knowledge more coherently. Prawat considers that "procedural knowledge is extremely limited unless it is connected to a conceptual knowledge base" (p.10).

Learners need to be able to integrate new knowledge with prior knowledge (experience), to form relationships. This means that in teaching copious amounts of propositional knowledge, which is foreign to the learner, it needs to be related to relevant experience; procedural knowledge.

Billett (2001, p.xiv) makes the distinction between conceptual knowledge and deep conceptual knowledge, which "is required to successfully complete non–routine tasks, such as the transfer of knowledge or addressing a novel problem and the monitoring of performance," thus making conceptual links, associations and relationships.

Prawat (1989, p.3) states that "conceptual knowledge is knowledge that something is *the case*, whereas procedural knowledge is more mechanical," requiring action.

2.4.4 The role of disposition in knowledge

In discussing learning, increasingly knowledge is seen to be three dimensional (Billett, 1998; 2001) with declarative or propositional knowledge, procedural knowledge and the third dimension of dispositional factors or dispositional knowledge (Prawat, 1989; Perkins et al., 1993; Billett, 2001; Katz, 1993). Katz (1993) concludes that dispositions are intrinsic to the *use* of knowledge i.e. that "knowledge can be acquired without having the disposition to use it" (p.1). She describes experience that is supported socially and environmentally by scaffolding,

as the likely source of development of robust dispositions but that "without such supportive experiences it is likely to weaken or perhaps be extinguished." While skills may be acquired during life, the dispositions required to use the knowledge and skills "are probably less amenable to reacquisition once damaged" (p.2). This view places huge responsibilities on those adults influential in the lives and learning of others (no matter what age.)

Dispositions have been characterised as attitudes, values, affect, interests and identities (Billet, 2001) while Katz (1993) distinguishes dispositions from skills, attitudes, traits and mindless habits. She describes dispositions as conscious, voluntary and directed habits of the mind. They are "intentional and mindfully directed toward particular objects and situations in order to achieve goals." As not all dispositions are desirable, the call is made by Katz for teaching practices to strengthen desirable ones and weaken the undesirable. Katz also differentiates dispositions from "thought processes, motives and work inhibition" (p.1).

Perkins et al., (1993) identify seven dispositions required for underpinning *good thinking* while Prawat (1989, p.25) highlights "two *motivational dispositions* or orientations:

1. Mastery – where the goal is to increase competence, and

2. Performance – where the intent is to do well and thus gain a positive judgement of one's competence" for self and/or others.

Differing cognitions or beliefs systems contribute to these differing approaches to learning, with *mastery oriented* learners focusing on the satisfaction of learning, as opposed to the specific performance or goal required – the focus of performance orientated learners. Thus, dispositional factors determine types of learning although both performance and mastery dispositions are important strategies to access as appropriate to each situation. Requirements may differ in workplace environments according to production systems, organisational culture and whether homogenous or heterogeneous knowledge skills and attitudes are valued.

2.5 Conclusion

This chapter has presented a non-exclusive review of content and theoretical literature relating to the research issue and an extensive overview of knowledge theory has been outlined. Chapter 3 describes the research design, including case study and interview methods, how data was generated and analysed and the process of emerging grounded theory.

Chapter 3

Methodology

3.1 Introduction

The purpose of this study is to explore how specific farmers learn in and for practice. The research seeks to discover how individual farmers learn differently and what contributes to their knowledge construction and use of that knowledge. An inductive approach is taken to enable theory to emerge from the data through analysis. Six central South Island (N.Z.) farmers were selected purposively as subjects for the study.

This chapter describes the research design, how data was generated and analysed and the process of emerging grounded theory. Ethical considerations and the importance of recognising and sustaining credibility are discussed.

The structure of the chapter has the following sixteen subsections:

3.2 Research design

3.2.1 Qualitative and interpretive

This current research is qualitative in design and approached from a constructivist and interpretive paradigm. Socially and experientially based, it seeks to understand the experiences of the subjects. The interview process of the cases aims to reconstruct (Guba & Lincoln, 1998) their process of learning in order to explore the research questions. The subjects tell their own stories, of their real worlds, in sharing their culture and in particular, their *learning culture*. Analytic and interpretive procedures (Strauss & Corbin, 1990) are employed to arrive at findings with possible implications.

3.2.2 Emergent data and theory

While research design was to be emergent, for proposal requirements and planning purposes a tentative design was outlined. This consisted of six case studies of selected farmers with semi-structured interviews, four interviews of key informants and participant observation of four farm discussion groups.

As the research progressed it soon became apparent that the planned 'key informant' interviews (those involving 'outsider experts' for another perspective on the phenomenon of farmer learning) were not directly relevant to the key question of how farmers learn within their individual and specific contexts. This proposal was then deleted from the modified design.

Later, after completing four participant observations of a range of farm discussion groups, again it became apparent that the focus of these observations should be as supplementary data (Lofland & Lofland, 1995). To write up these observations fully would have dominated data and distracted from the focus of the study. For these reasons the participant observations of farm discussion groups were limited to two (one sheep/beef and one dairy) for comparative purposes. They are included as data supplementary to the farmer interview data, to support or negate experiences and the views of the five farmers studied who are or have been members of a farm discussion group. This adds to robustness by seeking falsification or refutability of common data (Silverman, 2001). In the interpretive context, this is seen as adding richness and texture to data.

Likewise, the second farmer interviews were planned to collect more data on critical incidents and to fill any gaps in the data collection. The initial interviews were longer and richer than expected thus generating copious data for analysis. With some supplementary data collected through theoretical sampling (conversations and informal interviews) of relevant subjects, more than sufficient data existed to answer the research question. The follow-up farmer interviews were then modified to one of feedback, reciprocity, some member validation and theoretical sampling.

This supports the grounded theory approach (Strauss & Corbin, 1998) in which design is emergent with evolving *theoretical sampling*. Thus, the design of this research focuses on semi-structured, open-ended farmer interviews with supplementary data from comparative participant observations (Figure 3.1).

3.3 Access to participants and ethics

Farmers were selected for a range of profiles (Table 3.1) to provide for comparisons and contrasts. Questions in the mind of the researcher in selecting the sample ranged widely e.g.

- How important are formal qualifications for learning in practice?
- What is the difference between sheep/beef farmers and dairy farmers in learning in and for practice?
- Why do some farmers consistently lead new practice?
- What effect does limited/poor schooling have on farmers as learners for practice?
- What role does age or experience play in contextual learning?

Researcher networks were used to identify, approach and gain access to subjects for study. All participants were approached firstly by phone and when agreeable to take part in the study, an interview appointment was made. The research project and accompanying ethical responsibilities were discussed prior to interview and informed ethical permission given (Appendix 1). All farmers were interviewed on-farm and in their own territory.

All farmers were known to the researcher through either work contacts or other farming contacts. Being a farmer myself added to personal credibility and access as to some extent I was an 'insider.' Knowing the farmers and being able to talk 'shop' with them prior to and post interview was valuable for credibility and rapport, producing a relaxed environment, with honest responses and rich data. There were times during the interviews when the subjects responded to me as a fellow farmer.

For example, in discussing a farming issue Colin said, "what do you do, when that happens?" I responded that I'd tell him after we had finished the interview (which I did).

This describes a phenomenon in qualitative research in which, when the researcher knows his or her subjects and their workplace or social situation, one at times needs to move between the roles of 'insider' (fellow practitioner) to an 'outsider' (interviewer, data collector). Although this was not a major issue, it required a strong focus to maintain the role of researcher. While it is arguably almost impossible to switch completely between these two roles, a valid attempt to do so is important for the generation of valid, trustworthy and credible data.

Access to discussion groups was gained through various 'gatekeepers' namely farmers, known group facilitators or the relevant host farming family. Issues of 'insider'/ 'outsider' roles were similar. The process required the researcher to be an 'insider' thus unobtrusive while retreating to 'outsider' when observing and while making quick in-field notes as described later in this chapter. When writing the notes in full later, an 'outsider' role was assumed. Again, a discipline was required to maintain acute powers of observation in order to collect **valid**, **trustworthy** and **credible** data.

Table 3.1 **Case Profiles – Purposive sampling**

Name (Pseudonym)	**Farming Type**	**Age**	**Highest Formal Qualification**	**Self-rated performance**	**Innovator/ Adopter**	**School (level completed)**
Ben	Dairy	36	BAgSci (Hons)	7/10^	Early Adopter	7th Form
Colin	Dairy	49	None	8/10^	Innovator	4th Form
George	Sheep/Beef	39	DipFMgmt DipAg	7/10^	Early Adopter	6th Form
Henry	Sheep (ex Dairy)	50	None	4/10*	Late Adopter	4th Form
Joe	Sheep/Beef	52	None	8/10^	Innovator	3rd Form
Max	Sheep	55	None	3/10*	Late Adopter	4th Form

* Lower performer ^ Higher performer

3.4 Interview and observation schedules

The initial farmer-interview question design was piloted with a farmer and was modified accordingly. One section was removed due to its too complex nature. It focused on profitability, which is included in other similar studies, but which is better suited to a quantitative approach. The rating questions (Appendix 2) replaced the section removed.

Although an interview schedule (Appendix 2) was used for focus, the interviews were open-ended, allowing room for spontaneity and exploration.

While a tentative observation guide was prepared for an inductive participant observation of the discussion groups, the observations were conducted as unobtrusively as possible resulting in the schedule not being followed, although it did act as preparation and focus.

The participant observation method was trailed, with valuable researcher knowledge gained. This learning added to the approach of group observations by emphasising the need for keen powers of observation while continuing to participate in the group. Although four discussion groups were observed, just one dairy discussion group and one sheep/beef group were selected for comparison and in keeping with a supplementary data role.

3.5 Method

3.5.1 Case Study

To seek answers to the research questions farmers were studied in their 'real worlds' as case studies, with extended ethnographic interviews. Six farmers were selected purposively for a range in age, type of farming, level of formal education, innovation and farming performance, to give contrast and comparison (Table 3.1).

The case studies are both explanatory (how) and exploratory, (what) and (who), involving personal histories of learning; the subjects' ontogenies. In order to provide rigor and validity, multiple cases with triangulation are conducted to provide multiple sources of evidence (Figure 3.1) with data converging in a triangulating fashion (Yin, 1994). Schramm, cited (Yin, 1994, p.12) states that:

> The essence of a case study ... is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented and with what result."

This study seeks to illuminate decisions towards, and processes of learning, with subsequent results. It does not seek to represent a statistical sample but,

> to expand and generalise theories, (analytic generalisation) and not to enumerate frequencies (statistical generalisation)," (Yin, 1994, p.10).

Two farmer discussion groups are included as participant observations, for a view of learning-in-action. These observations are supplementary data to the focus i.e. farmer interviews.

3.5.2 Case Interviews

Extended ethnographic interviews are chosen to study the *culture of learning* with the selected farmers. An attempt is made to enter each farmer's world, and to glean the richness of each unique set of circumstances that influence their individual knowledge construction.

All farmer interviews were audiotaped with participant permission, which allowed the researcher to concentrate on the interview and follow-up questions. Brief field notes were taken and transcribed. The extended interviews of all cases were fully transcribed, for coding and to provide accuracy for quotes. It is generally accepted by most qualitative theorists that some transcription of tape recordings is essential for robust analysis and accuracy of data (Lofland & Lofland, 1995). Transcription also acts as a safeguard for validity. In this study, the transcriptions proved to be

invaluable for coding and categorising data, for identifying emergent concepts and for enabling possible theory to emerge with clarity.

Only relevant parts of the second interviews were transcribed as the purpose of these interviews (identified through emergent design) was for feedback, reciprocity (Harrison, MacGibbon & Morton, 2001) and some member validation; as supplementary data and insight (Silverman, 2001). This utilises an approach described by Strauss & Corbin (1990) in which actual transcribing is selective and in which data is revisited during analysis, with more transcription completed as possible theory evolves and areas of relevancy emerge.

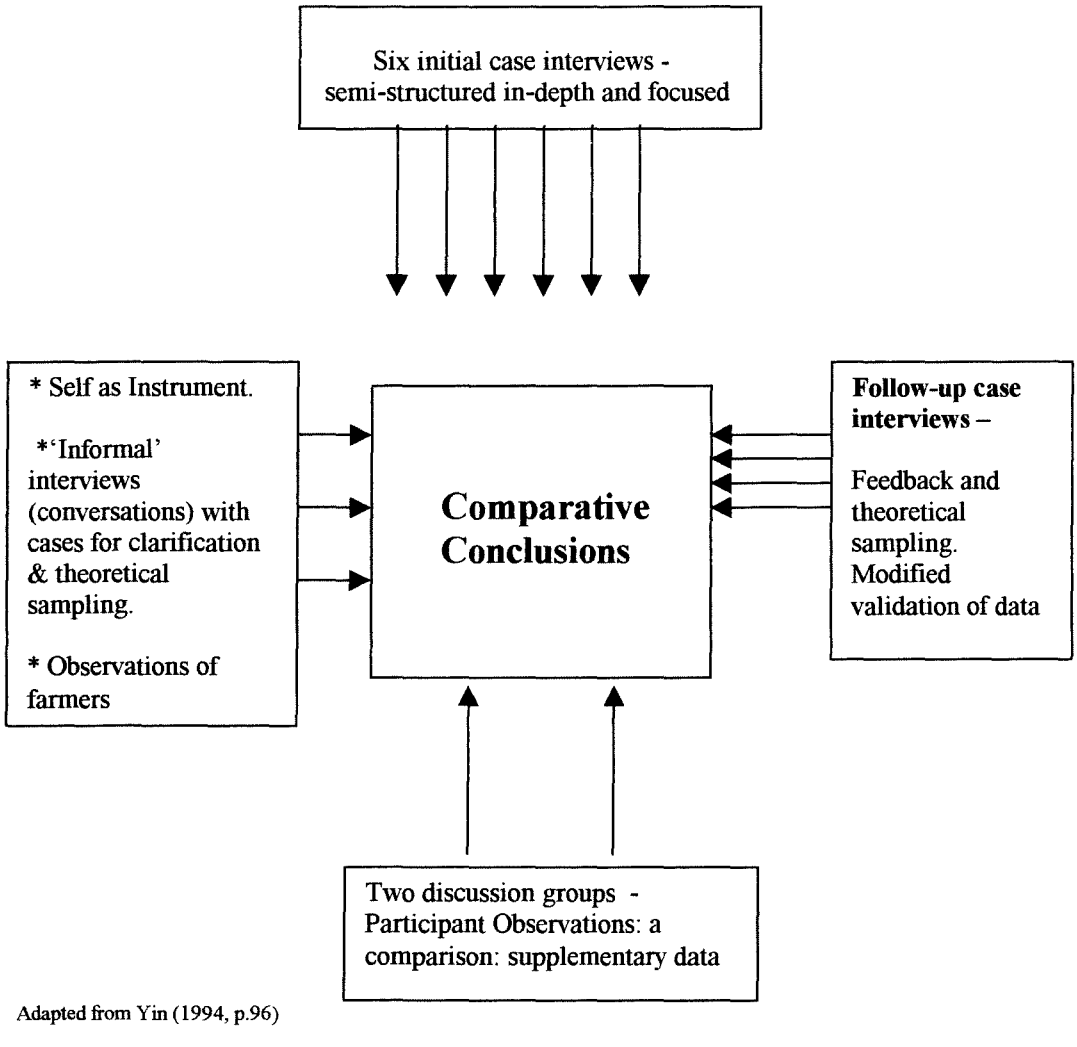
Larger studies of farmers and their learning have consisted of surveys or structured interviews resulting mostly in a wide range of questions answered by a large number of farmers. This research focuses on a small number of farmers as exploratory case studies, while seeking also to produce descriptive data as the participants tell their own stories. The long interview method (McCracken, 1988) is used for farmer interviews in an attempt to situate the numbers from other research "in their fuller social and cultural context" (p.9). The long qualitative interview gives "an agile instrument with which to capture how the respondent sees and experiences the world" (p.65). The focused nature of the semi-structured interview is to capture richness without drifting. The *critical incidents* in question design and analysis (Billett, 1994; McCracken, 1988; Strauss & Corbin, 1998; Creswell, 1994) are used to reconstruct work events, in order to identify learning processes and knowledge construction.

After researching the broad topic for study, identifying research questions and conducting an extensive literature review, a sorting process at this *global level* (Lofland & Lofland, 1995) generated a list of questions. Topics and areas for inquiry and discussion with the subjects were identified. The emphasis at interview was to obtain a personal account from each individual regarding his practice and personal history. This required probes to be focused. While interview questions were used as a guide, they were kept flexible in cases where subject matter had already been covered or when a subject was spontaneously offering rich data. Often probing that was prompted by a feeling that something was *not* being said, resulted in revelations.

At one point one farmer said, " you've been listening to us lately, haven't you?" meaning that I'd unearthed an issue that he had been grappling with over recent days (totally unknown to me). This is an example of the emergent and inductive nature of the interview process.

Figure 3.1

Convergence of Multiple Sources of Evidence



Adapted from Yin (1994, p.96)

Tape recording

The purpose of the research selection process and in particular why the subject himself was selected, were explained prior to interview. Ethical considerations including anonymity, confidentiality and reasons for taping were discussed. Permission for taping was obtained but signed for at the end of the interview when the respondents new of what content they were permitting usage. It was explained that the tapes would be destroyed after thesis obligations were completed. They were assured that there were no right or wrong answers and that their honest personal experiences were the important factor.

While all first interviews were taped, field-notes were also taken, as a back-up for tape failure and also to note observations and other relevant memos. A 30-minute period of Ben's interview was lost due to tape failure and the field-notes were utilised to fill this gap.

A total of fifteen hours of tapes were transcribed, with interviews averaging 2.5 hours in length. Field-notes of post-interview conversations were added to transcripts as footnotes.

Ethical dilemma

The first interview subject (Max), while readily agreeing to our meeting, was very nervous about being interviewed and also affected by the presence of the tape recorder. Twice the tape was turned off as I checked whether to continue the taping. After some discussion, the recording was persevered with but as researcher, I had some discomfort with his anxiety. As a result, the 'formal' interview was completed as quickly as possible (approximately three quarters of an hour). After the formality of the interview was completed and the tape recorder removed, Max then talked freely and rich data emerged. Hand-notes were jotted down and expanded later while

my memory was acute. On reflection, interview data from Max would have been better not recorded, as it was an inhibition to the flow of his interview responses.

This experience was an ethical dilemma, weighing up whether or not it was just an initial anxiety or something deeper. When I thanked him after a free flowing discussion over coffee, he said "it was nothing really - a piece of cake" but this realisation was due to relaxing in 'informal' chat. This 'problem' never occurred with any of the other cases, as they were not obviously affected by the presence of the tape recorder.

Lofland and Lofland (1995, p.64) write that ethical dilemmas are no more readily resolved in research than in everyday life. They conclude by quoting Urie Bronfenbrenner (1952, p.453):

> The only safe way to avoid violating principles of professional [the Loflands add, *and personal*] ethics is to refrain from doing social research altogether.

While not considering the occasion described as a violation of ethics, there certainly was a degree of personal discomfort.

There was a wide range of responses at interview. As described, Max was less verbose and gave direct, mainly short, responses to questions while others were very loquacious, which led to copious transcripts. Some interviewees were more direct and focused while others were rich with stories and observations.

3.6 Self-rating of practitioners

The farmers in this study rated themselves against other farmers on comparable types of farms. This could be described as a self-appraisal in which farmers reflected on how their benchmarks rated compared to other similar practitioners. This reflection was reinforced by revisiting the question three times in total. The cases firstly considered the rating personally, and then in regard to how they believe their accountant would rate them, followed by how their farm advisor would rate them. These ratings were used to compare lower performers (those rated 40% or below)

with higher performers (those who rated 70% or above). From the researcher's knowledge of the farmers, they rated themselves erring on the side of 'hard marking.' This was discussed with some at interview when other evidence pointed to a higher level. Joe was such an example, in rating himself reluctantly as high as 80% i.e. in the top 20%, when in discussion he revealed that he was in his farm accountant's top 10%. After consideration, he still wished to stay at 80% maximum, as he said:

> I know I still have plenty of room to move (and) there are many better operators than me out there.

This was a common attitude so ratings were left as contributed, since the two bands were thought to be indicative of the different levels of performance. Thus, the two bands are:

1. Lower performance (**LP**) – bottom 40% or lower (Henry and Max)

2. Higher performance (**HP**) – top 30% or higher (Colin, Ben, Joe, George)

As described, the farmers were asked to rate themselves three times to provide some validity and reliability to their personal rating. This process required the subjects to reflect with purpose. There was little discrepancy between any individual's triple ratings as the subjects adjusted their ratings up or down according to this reflective process. The final rating was an amalgamation of this reflection. The bandings were quite decisive with no cases rating outside the bands.

The honesty of this self-rating enabled a valuable comparative study to occur between subjects in the two bandings i.e. lower and higher performers. Excepting such willingness, it would have been difficult to conduct such a study without possible ethical issues. The subjects are admired for their honesty in the generation of this and other data.

3.7 Follow-up interviews

Follow-up interviews were conducted at the writing-up stage of the research. The main objectives of these sessions were to give and to gain feedback, to clarify issues, to seek some member validation and to act as a form of reciprocity. As a result, these encounters were more of a discussion or conversation than an interview although including some focused questioning. In all cases, the participants were intensely interested in the research findings. While at times there was some reluctance to accept some specific critical analysis (which was nevertheless retained), they invariably agreed that the analysis was valid. Generally, the subjects were able to recognise themselves in the results, both positively and negatively. This was viewed by both the researcher and participants with interest.

The subjects expressed interest in receiving copies of various diagrams and a copy of a paper to be written from the report. These reciprocal sessions gave a degree of ownership of the findings to the farmers, both as participants in the study and as features in the thesis report, while adding to the validation and robustness of the research.

3.8 Participant observations of discussion days

During the period of data collection, four discussion groups were attended by the researcher as a participant observer. To keep the data to a supportive role rather than dominating the research, one sheep and beef group and one dairy discussion group are presented in analysis. This also helps to maintain some anonymity of which groups were selected.

Any of the four groups could have been selected as typical of their type i.e. sheep/beef and dairy. They were all critical in their analysis of the host farming practices and generous in their praise when it was due. All groups had different dynamics due to their membership but the sheep/beef groups were similar and the dairy groups had a similarity to each other also.

3.9 Ethical Considerations

All participants for interview were briefed on process and informed regarding ethics. They were assured their names, places and other identifying marks or aspects would be changed. As rural New Zealand is a small place with people knowing others from great distances, the study is described as a study of Central South Island farmers, in order to broaden the anonymity base. Pseudonyms are used for farmers and identifying details are changed. Farmers were drawn from an area encompassing 160 kilometres in distance and including extensive areas of the Canterbury and Otago provinces.

Discussion group gatekeepers had the study explained to them so they could assist in deciding best strategies for access and observation. In most cases, it was decided that I would not speak to the group prior to the event, in an attempt to maintain the most natural setting and actions of the actors. In one case where I was well known, it was deemed appropriate to brief the group on my overt observation. I tried not to discuss my observations with the group, as I was aware of the need to write my notes and observations before discussing the situation with others, thus attempting to maintain relatively independent data.

As in some groups, participants attending on the day are not known prior to assembling, ethical permission would have been difficult to access individually, while maintaining an unobtrusive role. As neither group participants individually nor the group itself will be identified, ethical considerations were discussed with the gatekeepers. Enquiries indicated that any formal approach would be counter to the norms of rural culture and would spoil the spontaneity of the group situation i.e. making it less 'real.' I will seek to disseminate research findings to interested groups as a form of *reciprocity* (Harrison, MacGibbon & Morton, 2001).

3.10 Recognising and sustaining credibility

There is widely documented debate on the value of qualitative research in social inquiry. Much of this debate centres on the reliability and validity of qualitative studies. Kirk and Miller (1986) cited Silverman (2001, p.226) argue that

> qualitative researchers can no longer afford to beg the issue of reliability. While the forte of field research will always lie in its capability to sort out the validity of propositions, its results will (reasonably) go ignored minus attention to reliability. For reliability to be calculated, it is incumbent on the scientific (qualitative) investigator to document his or her procedure.

while Clive Seale (1999) cited Silverman (2001, p.227) sees reliability in qualitative studies as being associated with *low-inference descriptors*. Seale sees reliability enhanced by:

> ... recording observations in terms that are as concrete as possible, including verbatim accounts of what people say, for example, rather than researchers' reconstructions of the general sense of what a person said, which would allow researchers personal perspectives to influence the reporting.

This present study of farmers as practitioners constructing knowledge, has sought to present a report with credibility of research through utilising such practices.

Triangulation

Silverman (2001, p.248) views *triangulation* of data as a means by scientists to overcome the context-boundedness of data and for this reason he sees it as being of doubtful value to social inquiry which often seeks contextual explanations. Such a conflict was identified by the researcher when writing up this thesis report, which led to limiting the discussion group participant observations to supplementary data status. This was to avoid distraction from the major research activity of studying how the six cases learn within their specific contexts. This revelation led to changes in design and process due to its emergence.

Member Validation

Likewise, Silverman (2001) also has reservations regarding *member validation* of research findings. He cites Fielding & Fielding conceding that,

> ... such feedback cannot be taken as direct validation or refutation of the observers inferences. Rather such processes of so-called 'validation' should be treated as yet another source of data and insight (p.236).

Instead, Silverman (2001) suggests "five ways for validating such research:

- Analytic induction
- The constant comparative method
- Deviant-case analysis
- Comprehension data treatment
- Using appropriate tabulations (p. 248)"

Within the parameters of this current research, these five processes were practised with coding selected to identify categories, comparisons within cases, deviant cases identified and analysed and results accompanied by appropriate tabulations. Limitation to size of this thesis report means that only selected examples of diagrams are included although a range of individual concept maps and flowcharts were worked in analysis. For verbatim support of concepts and phenomena, generally at least two examples are presented in report, to strengthen the case of analysis. This intensive and inductive process adds to the credibility of emergent findings and theory.

Although *generalizability* is limited in a qualitative study unless it is combined with some quantitative measures of populations (Silverman, 2001), purposive sampling combined with theoretical sampling assists in a tentative or reserved *analytic generalizability.* The use of these sampling processes is discussed later in this chapter while generalizability is discussed in Chapter 6 (subsection 6.8).

3.11 Ontogenies and storytelling

The method of interview was chosen to seek in-depth and rich data from the subjects' personal learning histories. Silverman (1993, p.x.x) talks of an interview society in supporting the 'in-depth' interview. He refers to the dominance and popularity of such interviews in the media, which he sees as "seeming central to making sense of our lives." The subjects of this present study produced a rich array of personal stories through interview, contributing to an attempt to make sense of their specific pathways to learning, in and for practice

Cain (n.d.) cited Lave & Wenger (1991, p.80) argues that identity is reconstructed through:

> the process of constructing personal life stories, and with them, the meaning of the teller's past and future action in the world.

The personal stories or ontogenies of the subjects studied, have been analysed robustly and with theoretical comparisons and reflective interpretations from which theory has emerged. These stories are rich due to the openness, honesty and generosity of the actors. Cain suggests that:

> Personal stories do not just describe a life in a learned genre, but are tools for reinterpreting the past and understanding the self [or actor] in terms of [a specific] identity.

This current study has attempted to interpret the history of the actors, in order to construct meaning from their journey in terms of their identity as a farming practitioner and their possible evolving identity towards mastery.

Rich storytelling

While writing up this report it became evident that the masters, Colin and Joe, were being quoted as examples of emergent concepts, categories and theory more than were the emerging masters, Ben and George. On reflection and analysis, it became apparent that this was due to the richness of their stories and their wealth of knowledge. They have what Schön (1987, p.66) described as "a repertoire of examples, images, understandings and actions." It includes what the master has seen, known, experienced and discovered, all of which "are accessible to him for

understanding and action." They are able to tell of how they got to where they are now and how they are maintaining leadership and learning. While the emerging masters can talk of their process of getting to their current point, it lacks the depth of experience of the masters.

Jordan (1989) cited Lave & Wenger (1991, p.108), observed that stories play a major role in decision-making as experiences are recalled and recounted from a store of knowledge. Jordan defines such stories as "packages of situated knowledge" (p.108). The stories of the masters flow freely and unconsciously. They are able to move with fluidity from the past to the present and on to the future. The emerging masters have neither the extensiveness nor depth of past to refer to, or the ease of confidence that comes with success. They have though, a past with its own richness of full participation and full membership. They are what Lave and Wenger (1991) call *journeyfolk*, those in transition to masters, although they are relative old-timers with respect to newcomers.

Lave & Wenger (1991, p.109) view telling the personal story as a tool of diagnosis and reinterpretation, which is essential for construction of a functional identity. They distinguish between *talking about* (stories and community lore) and *talking within* (exchanging information) practice. According to this viewpoint, both forms of talk fulfil specific functions: engaging, focusing and shifting attention, while supporting memory, reflection and signalling membership. Through interview, the subjects reflected on their past and current practices through rich storytelling, recalling memories of their sociocultural construction of knowledge. Storytelling as discussed, is also an intrinsic part of participating in farm discussion groups; for talking about and within practice and supporting membership.

3.12 Analysis

3.12.1 Coding

All first interviews were taped and fully transcribed *by the researcher.* Silverman (2001) identified researcher transcribing as adding to the reliability of transcriptions.

While in this present study this was very time consuming, it added greatly to the researcher's awareness of data. Transcriptions were coded on opposing pages for concepts and general clusters, patterns, or themes. Memos were recorded as thoughts, interpretations and questions were identified for further data analysis (Strauss & Corbin, 1998). Adopting an inductive approach to coding requires a mindset flexible to emergent codes rather than preset performed codes (Lofland & Lofland, 1995, p.122). Overtime codings and memos were sorted and resorted as new patterns and themes emerged.

Critical incidents were mapped for patterns, both individually and comparatively. Concept maps, pathways and flowcharts were worked in order to find patterns. At times patterns that emerged were unexpected and often there was more fluidity than concretion in emergent patterns, which led to many inconclusive trails. While on the surface this research appears to be merely a small study of six people, it is in effect a study of an extensive array of critical incidents within the ontogenies of these six men as practitioners. A wealth of data analyses were accumulated in the form of post-it notes, charts, diagrams, tables and pages of memos and comparisons. These were regularly revisited, resorted and reworked, requiring constant organisation and reorganisation. Memos and diagrams were used to aid theory, building through recording the analytic process and clarifying emerging concepts, links and relationships.

Transcript pages were numbered with relevant quotes highlighted, colour coded and page numbers noted for inclusion as verbatim data, in the written report.

3.12.2 Transcription

As described, transcripts were coded on completion and memos were written as ideas, patterns and themes emerged. In all transcribing, quotation marks and other symbols were used to differentiate direct quotes from paraphrasing, recall or observations. Self-transcribing was a major task but it required the compulsory revisiting of each interview bit by bit and in minute detail. Data were heard that had not been *heard* at interview. It gave the opportunity to note coding categories in the

process of transcribing. Lofland and Lofland (1995, p.88) call this stimulating analysis:

> When a distinction, a concept, or an idea occurs to you (a *code)*, write it into the transcription as an analytic note. For out of these bits and pieces of analysis – codes and memos – you will build the larger analysis that will become your research report.

Analysis was *open-ended* and *emergent* in process, supporting the Loflands' view that:

> Field-studies are inherently and by design open-ended regarding ... analysis. Intellectually and operationally, analysis emerges from the interaction of gathered data and focusing decisions (p. 5).

Thus, analysis is a process of merging gathered data and focusing concerns until saturation leads to emerging theory. Consciousness of potential error and bias is some protection for validity and reliability or trustworthiness and credibility.

3.12.3 Participant observations and note-taking

Lofland & Lofland (1995, p.90) identify mental notes, jotted notes and memories as means of recording and recalling notes from the field. Participant observation field-notes in this present study, varied from one or two words, "scratch notes"; to fuller field-notes. In an attempt to be as unobtrusive as possible, notes were mostly written either walking or driving; in transit in the field. At times 'mental notes' were made in between for jotting down at the earliest convenience. A small farm pocket note-book was used for notes as well as writing on handouts as some other group members were also doing. At times it was possible to drop back from the group to make quick notes or when talking to the gatekeeper. It was important to make fuller notes as soon as possible while memory was acute. Making mental notes during the night as insight and ideas were revealed through reflection, indicated that one was truly living with the data.

Very few verbatim accounts were recorded during participant observations, due to trying to be inconspicuous in note taking. This resulted in more general paraphrasing.

3.12.4 Possibilities of bias

Strauss and Corbin (1998, p.97) say:

> The important thing is to recognise when either our own or the respondents' biases, assumptions, or beliefs are **intruding into the analysis** ... We must be able to stand back and examine the data at least somewhat objectively. **We emphasise that it is not possible to be completely free of bias.** (their emphases)

They emphasise the need to question bias and to be sensitive to indicators of such possible influences.

In comparing observations of sheep/beef and dairy farm groups and interviewing the farmers from the different sectors of the agricultural industry, the possibility of potential bias needs to be stated. As both the researcher and a sheep/beef farmer, I recognise the potential for bias or a perception of bias. While I concede that I have greater knowledge and probably affinity with sheep/beef farming, I have worked quite extensively with dairy farmers in recent years and so feel very comfortable with that industry. I have developed an understanding and appreciation of the differing sub-cultures. Being aware of possible bias has created a consciousness to observe for it, which I hope has limited such influences while recognising that this is difficult to achieve especially within an interpretivist paradigm. I also found that I had to be careful not to overcompensate for this phenomenon, in avoiding being critical of one industry over another. In writing this report, I have been aware of indicating any possible instances of potential bias.

3.13 Sampling

Sampling was guided by a search for contrasts to achieve comparative data leading to identification of emergent categories and specific classes of phenomena. Burns (2000, p.389) suggests that this "strategy permits the investigator to develop and study a range of types" rather than determining frequency. He identifies the goal of

qualitative research as "an explication of 'meaning,' rather than the isolation of 'truth.'

3.13.1 Purposive sampling

The six farmers were selected purposively for a range in age, type of farming, level of formal education, innovation and farming performance, in order to add contrast and comparison to the study. Purposive sampling, Silverman (2001), allows choice of subjects to meet the requirements of the phenomena being studied. He emphasises that such selection must be methodical and purposeful.

> Purposive sampling demands that we think critically about the parameters of the population we are interested in and choose our sample case carefully on this basis (p.250).

In this present study, differing levels of expertise were also sought for comparison. Billett (1997) considers an expert to be one with the ability to perform within significant non-routine problem situations in workplaces. Using this definition, all six of the farmers in this current study are experts in their particular fields but within this expertise, there are different levels of performance. Farmers are aware of what their peers are achieving and consequently know their level of performance in comparison to farmers on similar properties.

From this it can be assumed that there are differing levels of expertise. The superior performers are usually the leaders, innovators and early adopters of new practices, to whom others look to learn and to improve their performance; their level of knowledge, skill and disposition.

3.13.2 Theoretical Sampling

Strauss and Corbin (1998, p.73) promote theoretical sampling as a means of adding rigor to emergent theory. They discuss this process as:

> sampling on the basis of emerging concepts with the aim being to explore the dimensional range or varied conditions along which the properties of concepts vary.

In this present study, as questions arose in the researcher's mind, data was revisited. Further sampling was sought as further explanations or descriptions of patterns, concepts or phenomena. At times, it was necessary for clarification and validation purposes, to ask supplementary questions of individual cases, both to explore possibilities and to add rigor to emergent findings.

Silverman (2001, p.252) sees little difference between purposive sampling and theoretical sampling except "when the 'purpose' behind 'purposive' sampling is not theoretically defined." He cites Mason who describes the link between sampling and theory:

> Theoretical sampling means selecting groups or categories to study, on the basis of their relevance to your research questions, your theoretical position ... and most importantly the explanation or account which you are developing. Theoretical sampling is concerned with constructing a sample... which is meaningful theoretically, because it builds in certain characteristics or criteria which help to develop and test your theory and explanation.

Although in this current research no specific theory was in mind prior to selection of the subjects, from the above description the farmers selected as cases in this present study could be referred to as a *theoretical sample,* as they were selected purposively with a comparative proposal in mind.

Silverman argues that theoretical sampling has three features:

1. choosing cases in terms of your theory
2. choosing deviant cases
3. changing the size of your sample during the research.

While this study didn't follow the method of introducing new cases as the research proceeded, the sample discussed changed in profile as theory was compared and integrated e.g. at times all cases were discussed and at other times only the higher performers linked to certain concepts. Within the limitations of this thesis, theoretical sampling was employed allowing comparisons and contrasts to be made as analysis, theory and sampling interacted during the research process.

3.14 Theoretical saturation

Strauss and Corbin (1998) consider *theoretical saturation* to be,

> the point in category development at which no new properties, dimensions or relationships emerge during analysis (p.143).

and

> reaching the point when collecting additional data seems counter productive; the "new" that is uncovered does not add that much more to the explanation at this time (p.136).

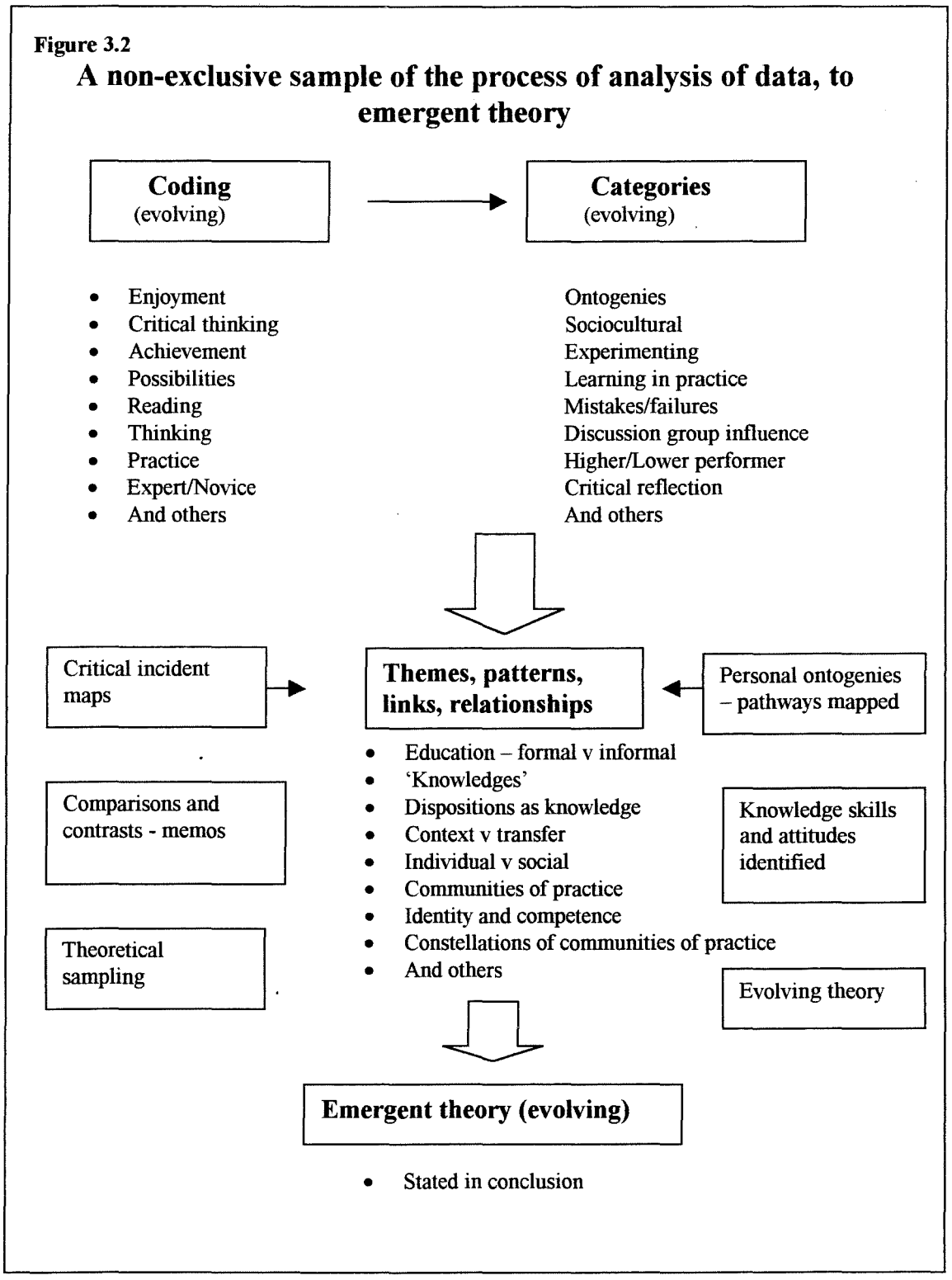
They acknowledge limitations to research in time and money, which eventually negate the perseverance for a lessened likelihood of potential newness to emerge.

This study of farmers followed a process of coding, categorising and linking concepts, patterns and themes to theory. The research design evolved as theory evolved (described earlier in this chapter). Concepts and phenomena were linked to build evolving theory until a point of saturation occurred. At this point, report writing commenced during which gaps were identified for further theoretical sampling, completing the saturation process.

As discussed in this chapter, current literature (Silverman, 2001; Strauss & Corbin, 1998) calls for investigators to document their procedure in reporting as a means of recognising and sustaining credibility. The following diagram (Figure 3.2) outlines the process that evolved during the analysis of data from interviews, observations and theoretical sampling, comparisons and contrasts (analytic induction tools). The codes, categories, themes, patterns, links and relationships are not exclusive but a sample of these concepts from within the study. The emergent theory, grounded in the data, evolved to that stated in Chapter 6 on conclusion.

Figure 3.2

A non-exclusive sample of the process of analysis of data, to emergent theory



3.15 Grounded Theory

Grounded theory was chosen as the method for developing theory from this inductive research, as the intention was to allow theory to emerge from the data. Strauss and Corbin (1998, p.12) describe grounded theory as:

> theory that was derived from data systematically gathered and analysed through the research process. In this method data collection, analysis, and eventual theory stand in close relationship to one another. A researcher does not begin a project with a preconceived theory in mind... (but) begins with an area of study and allows the theory to emerge from the data.

They see the design emerging during the research process, as concepts and relationships emerge from data, through qualitative analysis.

In this current study, *analytic tools* (Strauss and Corbin, 1998) were employed to facilitate inductive theory and to ground theory in the research data. These analytic tools consisted of:

- Asking questions that build an evolving theory
- Analysis of transcripts and personal stories (ontogenies)
- Analysis of critical incidents
- Analysis through comparisons and contrasts
- Theoretical comparisons
- Theoretical sampling by revisiting transcripts for further analysis
- Supplementary interviews of, or conversations with, cases for disputing or reputing new concepts and emerging theory

Strauss and Corbin (1998) see analytic tools as steering a researcher's thinking, away from the confines of both the technical literature and personal experience. The researcher 'lives' with the question and its emergent concepts and theory.

In this present study, an acuteness was experienced where I found myself thinking about links, relationships and emergent theory at all times of the day and night. Notes were jotted on anything available as moments of clarity were experienced. I was indeed living with the emerging concepts and theory.

Previous research into farmers and their learning, summarised in the literature review (Chapter 2), was not revisited until data was analysed, interpreted and discussed in report. This ensured that findings and theory emerged from data and not from other research. Theoretical comparisons driven by the emergent findings and emergent theory were synthesised into the report, adding to the robustness of both the process and the product. Some aspects of the phenomena studied confirm previous research while other aspects differ but the result is an original view of six farmers and their learning, inductively constructed.

Through the process of analysis, I was often working purely on *instinct* (a socially constructed concept and practice). By exercising "an interplay between conditions, the responses of actors and the consequences that result" (Strauss and Corbin, 1998, p.193) theory emerged grounded in the research data. Punch (1998), promotes an approach of 'just doing it' and argues against being overly restricted by following a method with formality. By trusting my instincts to a large degree, I was pleased to capture the essence of Strauss and Corbin's method of grounded theory with some celebration of the research findings. These theorists themselves encourage such personal recognition.

This research methodology began with what Lofland and Lofland (1995, p.71) call

> mucking about ... when the researcher becomes a kind of human vacuum cleaner, sucking up anything and everything she comes upon that might even remotely prove useful.

It progressed through 'running on instinct,' to a formal analytic process with a conclusion of grounded theory. This current study adds to current research and introduces new parameters for further research into farmers learning in and for practice.

3.16 Conclusion

This chapter has reviewed and discussed research design, methods, data generation, data analysis and grounded theory, in relation to an inductive and constructivist approach to research methodology. The following two chapters (4 & 5) demonstrate these methods and processes in practice, while presenting and discussing analyses of data in relation to theory. Chapter 4, part one of the results and analysis, explores the personal histories of the cases and analyses how these ontogenies relate to the individual participant's learning. Cross-case analyses are synthesised with the cases' personal stories.

Chapter 4
Ontogenies – Personal Histories, Influences and Experiences

4.1 Introduction

This chapter presents the first part of the research results and analysis, with some synthesis of key findings from the personal histories of the six cases. An ontogenic approach is taken in seeking to explore the background and introductory stages of learning in the farming careers of the six cases.

The structure of the chapter has the following seven subsections:

Individual concept maps were constructed from data to depict learning pathways of the farmers studied, their entry into the farming culture, and their progressive learning through practice. To simplify and synthesise results, data were amalgamated into four pathways for contrast and comparison.

As data was generated, it became apparent that there was a range of comparisons that crossed pairings, so data are presented in a mix of analyses and syntheses between and among the farmers in cross-case analysis. There is a broad banding where Max and Henry are referred to as the lower performing (LP) farmers with Joe, Colin, George and Ben referenced as higher performing (HP) farmers. The process of selecting for these bands is described in Chapter 3. Of those higher performers, Joe and Colin are identified through analysis as *masters* while George and Ben are identified as *emerging masters* (see glossary). To assist the reader in following this synthesised data analysis, the abbreviations of (LP) and (HP) as below, are used regularly.

- Max and Henry — Lower performers **(LP)**
- Joe and Colin — Higher performers **(HP)** and masters
- George and Ben — Higher performers **(HP)** and emerging masters

4.2 Sociocultural histories of practice

Billet (2001, p.37) considers that individuals learn not merely by a process of socialisation but that practitioners "ultimately construct knowledge and determine what they appropriate, what they ignore and what they merely learn in a superficial way." The individuals' non-uniform responses to experience are influenced by their personal histories. This ontogenic approach to personal backgrounds is the basis for enabling the cases studied to 'tell their own stories' through rich data, in relation to practice and knowledge theories. A narrative style is chosen to enable the reader to get to 'know' the subjects, share in their experiences, their realities; their 'real worlds'.

In this study of six farmers, four of the six cases grew up on farms with their knowledge embedded in sociohistorical interactions within the culture of farming.

4.2.1 From the beginning – growing up on farms

Within the farmers' stories, although each is unique, there are common experiences with differing pathways and differing results. Colin (HP), George (HP), Max (LP) and Henry (LP) all grew up on farms where as children, farming was the only life they knew – sociocultural immersion. All have stories of working on their family farms at a young age. It was simply part of their known culture and they all loved the way of life it entailed. They refer to this as "the lifestyle."

George tells the story of his immersion in farming from birth:

> The necessity was that my parents were in the development stage of the farm then and Mum was very much hands-on in the farming operation and as a pre-schooler I went out the door when she went out the door helping Dad. And in the early years in the winter, they had a big tea chest bolted onto the front of the farm trailer and I'd be loaded into there with hotties and what have you, - toys and books. And that kept me out of (trouble) until I got bigger and I could get out or they would let me out depending on the weather so yeah – farming was... I just grew up with it. (George)

By quite a young age all four were working on their family farms:

> Probably when I was about 12 years of age – that last year at primary school – I was itching to get home to be out on the lambing beat after school. Dad might be on the tractor or something. Then I'd report back to Dad what needed to be done or he'd ask me what I'd seen. If I could catch the ewe I could complete the job (of lambing the ewe) on my own, which wasn't always the case. But often those were sheep that weren't going to run because they were feeling uncomfortable so if you moved quietly about the paddock you could get up to them and catch them with a crook, without needing a dog... I used to pester Dad in the weekends about what needed to be done. (George)

> I had my own dog when I was more like 12 (years old) and was capable of getting the sheep home to the yards on my own and taking them back (to the paddock – a considerable distance). ... I probably learned the actual pulling of a lamb as a 5 year old or less. I did it on my own during the school holidays or Saturdays and Sundays or after school if I had half a choice. Yeah, I used to take 'sickies' (from school) – tried my luck... I would have gone around the lambing beat by myself, on horse, at 10 to 12 years of age. (Max)

At times when the need arose, these youths completed quite complex and physically exerting tasks, at an age when many of their urban peers were most likely playing games or sport.

Colin described a period of his childhood when his father needed to work off-farm for financial reasons. At 9 – 10 years of age

> ...me and my younger brother would run the farm. Dad used to milk in the morning and he'd be gone at daylight and we'd do all the washing up. We would put the cows back in the paddock, check the cows, do what had to happen there and go to school. Come home, pick the cows up and often we'd milk them between the pair of us. We had to do it for survival of the whole family. We had to dob in and help, otherwise the whole thing would have tipped over. Yep – real early responsibility. ... I think that had a big part to play in my learning. (Colin)

These rural youths were very accomplished at a range of activities requiring horsemanship, tractor driving skills, motorbike skills and stockmanship. There is little doubt that these four farmers developed their love of farming and much of their knowledge and skills 'socioculturally;' (Lave & Wenger, 1991; Wenger,1998) from living and working within their community of practice while immersed in their culture of practice. This culture was manifested in, and influenced by, the rural infrastructure of community, rural schools, district functions, shearers, workmen, casual labourers and others who entered their worlds.

4.2.2 Schooling

Five of the six cases had poor experiences with schooling with only Ben (HP) having a smooth ride through school. Joe (HP) expressed the experiences of a traumatic and misunderstood schooling:

> (My) experience at school was not good. Didn't enjoy it all – left as soon as possible. I seemed to be frustrated at school in that I felt as though I knew the answers but was never able to actually express them or put them on paper although at the back of my mind I felt I had the ability, so consequently it was very frustrating (Joe).

He recalled knowing more than the so-called bright kids, especially at science and social studies and he couldn't believe they asked such basic questions about things that he 'just knew.' Things they couldn't understand, were an intrinsic part of his knowledge but this was not recognised and he was:

> ...put in the dumb category or the not trying category. I detested going to school – absolutely detested it ... to go there and have all your worst aspects paraded or what I believed were my worst aspects paraded, wasn't enjoyable (Joe).

Joe is now a leading farmer in his field but still expresses with feeling the scars of a schooling, during which he felt gravely misunderstood.

Colin (HP) also expressed similar experiences.

> I was a struggler at school. I was told I was lazy... I have always been a bit deaf and I think sometimes I didn't hear what people said... (teachers) told me I was a loser ... they told me I'd never survive in the real world. ...I always thought I did try but if I went back today I'd try harder. ...There were teachers there who didn't try one bit to teach me (Colin).

He reflected that he would like to visit many of his former teachers and show them that he has been remarkably successful and could "buy them out ten times over."

While Katz (1993), would believe that in such circumstances irreparable damage may be caused to a young person's disposition for learning, these men found their niche in farming and are performing consistently at top mastery level; looked up to by their peers as leaders in their respective fields of agriculture.

Both Colin and Joe (HPs) give some insight into how their schooling influenced their choice of career and their lack of formalised education.

> I think when I went through school I always had it in my mind that I would go farming because in those days, more than today, the dumb one's went farming...yeah, my experience at school probably directed me into farming. (Colin)

Joe reflected that if he had been more successful at school he may have been an engineer or something similarly practical as he couldn't even imagine anything purely academic at that stage. Farming at that stage was an impossible dream:

> I never thought I would ever be able to own a farm – it was beyond my comprehension that I could ever own something so valuable and so wonderful. That's why I would have gone engineering. (Joe)

Thus, he agreed that the lack of success at school indirectly enabled his 'impossible' dream to be realised.

While Joe was a non-reader at school, he "discovered" reading as an eighteen year old and has since read avidly. He has a lack of confidence in anything that requires handwriting (of which he has a messy style.) Joe puts this down to the isolation he felt at school due to being a left-handed writer who couldn't change modes, as was the preferred answer of the day to this "problem." This has limited attempts he has made over the years to gain formal qualifications.

> I did try to do some correspondence courses at one stage (but) the writing aspect of it reminded me of too many bad times so I didn't proceed (Joe).

It could be said that both Joe and Colin (HPs) have learned *in spite of* their schooling. While neither have formal qualifications, they have both educated themselves to a very high level through a formal working situation in a sociocultural, experiential environment. They have acquired this within a distinctly formal process of reading, research, consultancy, specialist field-days, and experimenting 'on the job'. Therefore, while they have no formal qualifications, they are both highly educated.

George (HP) also had problems with schooling, although with both of his parents being tertiary educated, their approach to George's schooling difficulties was to employ a private tutor at High School level, to help him achieve and proceed to tertiary level education. He completed two undergraduate Diplomas in Agriculture and Farm Management. Both Joe and Colin had parents with no formal education.

All except Ben, (HP) completed primary schooling at small rural schools with Ben completing all his schooling in city schools where he was a high achiever.

4.2.3 Leaving school to go farming

Of these four subjects, George, Max and Henry all came home to work after leaving school, while Colin left school to work for a neighbouring farmer. At comparative stages, George and Max were on their family sheep farms while Henry and Colin were involved in dairying. It was common for these young men to work casually for farmers other than their fathers, at times.

It is common to both Max and Henry's (LPs) stories that while they worked alongside their fathers or the "headman" and often completed facets of farming on their own, they never progressed past a certain level of complexity. There were tasks that were guarded by their fathers or the "headman."

Some of this may have been due to their physical limitations at the time or possibly due to the critical needs of production. It is more likely though, to have just been the

routine of their particular farming operation systems and the management culture within their *communities of practice*. By continued lack of access to *full participation*, both Max and Henry (LPs) had limited learning for progressively complex tasks. This is in complete contrast to the progressively complex tasks of Max's childhood. While during childhood he was advanced in skill and responsibility for his age, this progression became limited as a young adult.

In discussing haymaking Max said:

> I probably picked it up from the baler driver or hay contractor. We had contractors for two years and then Dad bought his own baler. The headman drove the tractor so he drove the baler too. I was part of the stooking of hay and cartage and learned from the other men. There were four of us here at that stage – in fact there were five of us for a short period (Max).

Max never drove the machinery nor took charge of the process until much later on with the death of his father and departure of the headman. Similarly, Henry also remained the 'helper' without taking progressive responsibility.

Lave and Wenger (1991 p.101) writes of the essential nature of full legitimate access for progressive learning to occur.

> To become a full member of a community of practice, requires access to a wide range of ongoing activity, old-timers, and other members of the community, and to information, resources, and opportunities for participation.

and

> Because the place of knowledge is within a community of practice, questions of learning must be addressed within the developmental cycles of that community (p.100).

While the reason for Max's stalled progress is unclear, the structure of the workplace and the division of labour with five men working there at the time, kept him as a legitimate peripheral participant (LPP) for longer than desirable. Lave and Wenger (1991, p.36) recognise that LPP can be a

> source of power or powerlessness, in affording or preventing articulation and interchange among communities of practice.

Because of this limiting experience, both Max and Henry were truncated in their progress to full participation. According to Lave and Wenger (1991, p.111),

> Moving towards full participation in practice involves not just a greater commitment of time, intensified effort, more and broader responsibilities within the community, and more difficult and risky tasks, but, more significantly, an increasing sense of identity as a master practitioner.

Neither Max nor Henry developed an identity as a master practitioner and this deficit remains with them today.

4.2.4 Imposition to full participation – Henry and Max (LPs).

Full participation was imposed on both of these men at a mature age upon the death of their respective fathers, when each was over 35 years of age. Henry who had "picked up most of (his) knowledge from Dad" described the sudden catapult into prime responsibility for management and decision-making, as quite a traumatic transition.

> It was a hard time doing all the work by myself without having anyone to discuss it with (Henry).

To bridge this gulf in experience he used a stock agent to buy and sell cattle and continued the routines he had learned from his father. While Henry enjoys most aspects of his work, he went farming "because he had the knowledge as a kid." It is doubtful that an actual decision was made to go farming, as it appears that he was led into it from a sociohistorical expectation. His personal identity, constructed within his familiar culture, accompanied by subtle (or overt) familial pressures, may have limited other options.

Mentoring

Max had a similar experience when his father died. His response was to use an experienced farmer as a mentor. This arrangement lasted for an extended number of years until illness caused the mentor's unavailability. Max has attempted to replace this relationship with little success. He expressed regret at the termination of this support, which was largely his lifeline. For Max farming has been a struggle for the

last 10 – 15 years both financially and personally. This has been due mainly to a lack of confidence in decision-making and risktaking.

Ibarra (2000), refers to a new mentoring landscape with rich apprenticeship experiences, where the traditional model of mentoring, that of coach, friend and supporter needs to be extended. She considers that it needs to encompass one of a *challenging* advisory role, steering the protégé towards a broad set of people and experiences: "helping smart people to learn ... to make the leap and take flight" (p.155). Max was not challenged in this way by his mentor. This then reinforced his incomplete apprenticeship of his youth and young adulthood. His participatory role was limited to what could be described as *partial* rather than *full participation*.

This combination of experiences throughout Max's early and mid-farming experience has not helped to develop a disposition for self-directed learning, which in turn has contributed to his self-rated lower performance.

Max's experience of working on the family farm did not provide an effective platform for development towards management level and towards mastery. While his family farm in its day was a good model of the then current farming practices, there is a need to be continually developing new knowledge to keep to the forefront of practice. This never occurred and subsequently the farm was left behind as technology progressed rapidly.

Specific expertise

In contrast to his farming experience, Max was developing in parallel, skills as a breeder and competitor in dog trialing i.e. a competition over a range of courses where a sheepdog and his master are put through their paces, against other competitors. Working dogs became his passion and he developed an expertise in this area at a young age. His initial comment at interview was that this expertise was "self taught" but on further inquiry it became apparent that he:

- "Watched other fellas"
- Was a member of the local dog trial club where he learned "ten times the amount than from watching other people."
- Practiced on-farm "all the time."
- Had mentors whom he observed, questioned, aimed to emulate and whom he found challenging.
- Was a legitimate participant of the dog trialing community of practice and consequently immersed in the culture.
- Was required, as a competitor, to excel as an individual independent from the other members.

This describes a socially constructed learning process, which was developed within an unofficial 'apprenticeship,' or guided learning. Max was part of a community of practice (other dog trialists) who supported him in peripheral practice while challenging him to the expertise required for *full participation*. This process was embedded in a culture of practice that provided challenging mentors and a challenging platform for Max to achieve to a high level competitively. He became a true master at this practice. A display of records, books and the telling of rich stories, provide a glimpse of the enthusiasm and passion Max has for his involvement with working dogs and the depth of knowledge and skills required for mastery. Thus, Max has the dispositional knowledge required for this particular knowledge and skills to be used and maintained to the highest level of mastery.

In comparison, Max's learning process for farming knowledge and skills was "from watching and being about the men." He mainly did the physical work e.g. stacking hay. He didn't drive the tractor (more responsible work), as this "was the headman's job." He could not isolate any evidence of moving from the peripheral participation mode (LPP) to full participation and its associated responsibilities. It appears that his learning was truncated at a more novice level of involvement. While Max had a love of farming and the associated way of life, his progress was stalled. This lack of progress to responsibility is contrasted by his progress to mastery with his dogs. There is no evidence of transferability of this mastery knowledge, possibly due to the

lack of access to *full membership* (and associated increasing responsibilities and recognition), in farming.

4.2.5 Staying at home or leaving – cross-case analysis

There are many commonalities between Max and Henry's stories. They were both limited by:

- A lack of real decision to go farming
- A lack of progress within their unofficial 'apprenticeships' within their families
- A sudden and forced transition to full participation with the subsequent responsibilities
- A reliance on the historical knowledge of their childhood which limited their learning

Both Max and Henry (LPs) rate themselves in the bottom 40% of farmers of their type. While it is debatable to what extent their lower performance may be attributed to situational or dispositional factors, it is likely that the situation described, limited their progress by stunting their growth to a full range of higher-order expertise.

Colin, Max, Henry and George were all immersed in the culture of farming during their childhoods while growing up on farms and it could be assumed that they served their 'informal apprenticeship' in this natural setting. There is evidence though, in their stories, that while they were often very proficient at routine tasks, they never advanced to the more complex tasks of a practitioner while working on the family farm.

Colin and George (HPs) went on to complete progression towards mastery through very different processes. In contrast to Max and Henry, they progressed from working at home to working for other farmers thus developing other communities of practice.

4.3 Influences of new communities of practice - Colin

Colin experienced a range of workplaces consisting of casual farm work, other off-farm work and contracting. He ran a small hay contracting business for 5-6 years before taking a position contract milking. During this time he was supported in a partial participatory role, with progressive responsibility leading to 50/50 sharemilking the next year. This is the next step in the dairy industry career ladder. At this stage he was aged approximately 23 years old and he thought, "one of the youngest around to progress that quickly."

While Colin's lower-order procedural knowledge of dairying was more than adequate, his career pathway had failed to prepare him for the more complex tasks ahead.

> What the hell do I do? And where do you learn to calve a cow; because at home when I was working for Dad whenever there was a problem with a cow calving, it was always a problem so he did it - cause he knew more about it than me. So the first time I calved a cow I didn't have a clue what I was doing...
>
> And a lot of things were like that. Grass management – I didn't have a clue, didn't have a clue. I suppose I (learned it) from looking over the fence. Watching other people. Going to discussion days. Knew a couple of guys ...who helped me quite a bit. They don't know they helped me ... I used to pick (one farmer's) brains all the time – you know and I suppose after a year or so you soon pick it up.
>
> The other way that I learned,- I learned at my own cost. I knew if I made a mistake it was going to cost me money... Like if a cow's going to die of bloat – how am I going to fix this? I didn't go and read a book about it – I soon learned ... because I knew that a dead cow was going to cost me money. That's how I learned most of my stuff, I suppose. (Colin)

Many gaps in his knowledge were learned through trial and error, or "just doing it," and *experimenting in practice* (Schön, 1983). Although this was a challenging and at times "nerve wracking" period, Colin successfully increased his areas of expertise towards a more diverse range of knowledge and skills resembling *full participation;* gaining *membership* to a community grouping of the dairy industry – sharemilkers.

Colin's next step was land ownership and running his own farm. During this period he experienced extreme climatic adversity and spent ten challenging years "trying to make it work."

Talk about mistakes – the whole bloody ten years were one big mistake. (Colin)

During this period of dryland dairying, Colin was supported and encouraged by two new mentors, both experienced in practical farming, who became his advisors. These men, who Colin approached personally because he admired their practice and knowledge, became his 'sounding boards' and helped him through this difficult period. While these mentors were supportive, they also challenged his belief system (regarding dairy farming practices) and were a catalyst for his eventual progress back through the sharemilking route to his present land ownership and to his present position as a leading and high performing dairy farmer.

Crucial points in (HP) Colin's progress are:

- He was not protected by his family in his desire to go farming. He was required to relocate both physically and psychologically, and to "fight my own battles."
- He made challenging decisions that required risk-taking.
- He ferreted out mentors and advisors who were both supportive and challenging.
- He actively sought successful farmers and learned from them.

4.4 Undergraduate study and new practices – George

In contrast to the preceding three farmers' sons, George's career pathway from leaving school consisted of a year working on the family farm, a year working on another farm followed by two years at Lincoln University where he completed a Diploma in Agriculture and a Diploma in Farm Management.

During this tertiary study, George (HP) needed to develop his verbal, reading and writing skills, which were limited. This inadequacy was cushioned by the structure of the undergraduate diplomas, which required "two years of varied practical farming prior to entry." The course work was specific and contextual in approach.

> I could see why the two years practical farm work were so necessary and on a range of farms, because the lecturers and the notes and everything related back to what you'd actually been doing ... I wasn't sure if I was going to cope (with the reading, listening, and taking notes) ... but because of the practicality of the way the course was put together, it was actually something I enthusiastically embraced and got engrossed in, as well as general university life was a lot of fun. Meeting a lot of people all over the country. (George)

George described a supportive culture in which lecturers were more interested in what you knew than "in penalising you too hard for errors in spelling, and grammar not being absolutely correct." This scaffolding coupled with a mature attitude to the academic work, resulted in improved skills and development of a belief in himself; a disposition for learning.

George's experience demonstrates how his procedural knowledge (gained through practice on several farms), made it easier for him to then develop propositional knowledge from the course content. Through relating it back to practice for interpretive understanding and the development of conceptual understanding, he was able to make links and form relationships between concepts and experience.

The legitimacy of being part of the university community of practice and the surrounding culture, coupled with scaffolding and recognition of his practical skills and experience, helped develop a stronger disposition for learning. George now as a full participant and emerging master, has a confidence in seeking knowledge resources. He has learned how to learn and has a confidence in his ability to question the validity of scientific research and other knowledge. The sociocultural interaction at Lincoln University both academically and socially, contributed to his ability to learn through his enjoyment, enthusiasm, and engrossment in the university culture.

Post-university, George's experience on farms was somewhat reversed with his university based propositional knowledge being compiled in practice and proceduralised.

> I learned about growing barley when I was working on a sheep and cropping farm (prior to university) and I was just doing what I was told when I was there 'cause I was just young and didn't understand all the (science) of cropping. But when I got to Lincoln, I really got an understanding of how it all came together, fitted together, and the timings of things and why you are doing this and that. And so it was really a chance (after Lincoln) to go and put that theoretical knowledge into play (at his new farm employment). And I think with reasonable success for their barley growing programme. (George)

He described a similar process in growing winterfeed on the same farm. Decisions made prior to his employment resulted in a crop failure and he:

> sort of looked into the wonders and whys and hows and discussed that with my employers and the stock manager as to what I thought had gone wrong with it. (George)

He was encouraged by his employer to take responsibility and to make changes to practice accordingly. George recalled propositional knowledge from Lincoln and they "got in the cropping advisory person" who confirmed George's conclusions. George then:

> went and talked to a couple of other good cropping farmers in the district and found out about their (practice strategy). Had a good look at their paddocks and thought it was the way to go. (George)

The result was an award-winning crop the next year.

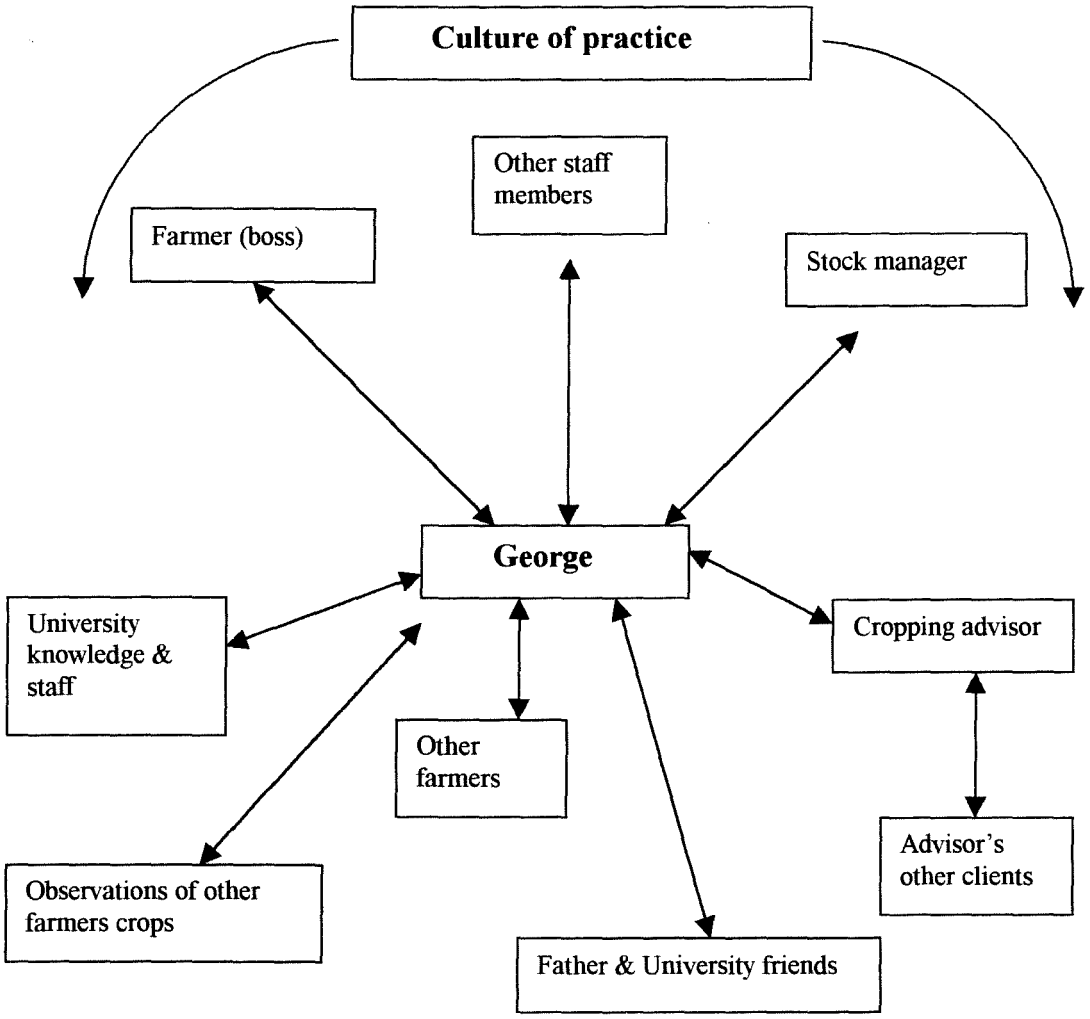
> I went there just as an extra pair of hands - just helping out wherever but ... the job evolved into me becoming the agricultural manager. (George)

This large Southland sheep and cropping enterprise while employing a relative novice at cropping, by legitimising the initial peripheral participation within this community of practice and validating his observation and enquiry, resulted in improved practice. George's propositional knowledge gained at Lincoln University gave him the confidence (dispositional ability) to question and analyse the practice but the sociocultural engagement ultimately enabled the process to happen.

This learning took place in a fully participant and legitimate framework, not just in George's mind. It wasn't merely George's idea but involved all members of the practice including those on the periphery, (the cropping advisor and other cropping farmers). The openness of the practice allowed for learning to occur not only for the *newcomer* (George) but also for the *old-timers* and other partial or full participant members of the wider culture of practice (Figure 4.1).

Figure 4.1

An example of a Community of Practice.
George (Southland farm) – embedded in a culture of practice.



- Legitimate peripheral participation and the subsequent sociocultural immersion provided access to a wide range of resources.
- Transparency is revealed by the openness and availability of shared knowledge and experiences. Lave & Wenger (1991, p.102) refer to transparency as "the way in which using artefacts and understanding their significance interact to become one learning process."

LPP and transparency enabled George (HP) to construct knowledge through situated learning - belonging to a community; doing in practice; becoming 'a kind of person' and negotiating meaning through experience (Wenger, 1998; Lave & Wenger, 1991). The invisible became visible through legitimate access to resources. A synergy occurred in learning-in-practice, due to a specific need.

This process reversed when after two years, George returned to the family farm as a farming partner; having bought a neighbouring block of land. George brought back his knowledge of cropping farming to the family enterprise

> because it was paying better than sheep returns at the time and the economic reforms of the fourth labour government required a strictly economically strategic approach. (George)

During this time he:

- Rang up farm advisors
- Went to every public cropping field day that there was ("both Dad and I")
- Read various things
- Used good farm (cropping) representatives
- Kept to a simple system (allowing for focused expertise to develop)

While the management was shared, George was keen to learn as much as possible from his father whom he still regarded as the senior partner; the master and his mentor. He has great admiration and respect for his father whom he greatly admires for his farming achievements and mastery.

This working relationship was one of mentorship with reciprocity, in which both members were transformed through engagement in practice.

This two-way respect and admiration by both the *master (mentor)* and the *partial participant,* extended to a relationship of empowerment for both parties. In contrast, the experience of Max (LP) and his mentor was more one of dependence. George's model allowed the advancement to full participation and growing expertise for when he assumed the major role of "taking over the company" after 11-12 years of a working partnership.

> I was actively seeking and wanting their (his parents) advice in the early days. Gradually this role swung more to my side as they began to think about retirement – (with) that transition, (the) balance changed to falling more on my shoulders. (George)

George has responded to the challenge and has continued to progress and extend his business with the knowledge and confidence of an emerging master.

4.5 Influence of non-farming communities of practice - Joe

While Joe (HP) didn't grow up on a farm, he lived on the outskirts of a large provincial township. He attended a rural school and many of his school friends lived on farms. This allowed him to grow up as a legitimate, while peripheral, participant in the rural culture of the district.

> I was always involved in country (life) and at 11 (years of age) I worked in the school holidays with a family acquaintance. I thought farming was probably the most enjoyable thing you could do. (Joe)

At this young age, he worked with the farmer drenching sheep, fencing and tractor driving under supervision. He was "brought up with machinery so probably knew how to drive a tractor." Possibly, due to his young age and the transitory nature of this farming experience, Joe (HP) has no real memory of learning from this farmer apart from "watching him and doing what I was told." Joe experienced some facets of the farming culture without the total immersion indicated in the Legitimate Peripheral Participation (LPP) of situated learning theory. The experience though, was instrumental in sowing the seed socioculturally for Joe's future farming career.

Joe's traumatic schooling, which left him with a total lack of confidence in his academic ability, was the catalyst for him leaving school at the end of third form, before his fifteenth birthday. "I just never went back to school." On leaving school, he began working for an earthmoving contractor.

> I tried to be an adult – was employed as an adult and had to do adult things – drive machines, trucks, cook food, do levels, maintenance, mechanics (and) a variety of jobs. Although there was no doubt about it that I was still only fifteen, no matter what. (Joe)

Joe described an unofficial 'apprenticeship' or guided learning process:

> I learned through associating with people, learning off people who were doing (the various jobs), just practical – practical experience. On the whole the others (workmates) were good, helpful (and I was) working *with* people most of the time at that age. – I certainly never worked in (total) isolation. I just learned off people by working with (or alongside) them. (Joe)

He recalled practising on the big machinery at lunchtimes and likened it to how young shearers learn by rushing through lunch so they can have a practice while the machinery is available. Joe was fully involved:

> I was employed to do a job so I had to front up and do it, not just watching, and the bits I couldn't do I had to ask about. (Joe)

Joe's description supports Lave and Wenger's (1991, p.95) proposition that

> newcomers legitimate peripherality provides them with more than an *observational* lookout post: It crucially involves *participation* as a way of learning – of both absorbing and being absorbed - in the culture of practice. An extended period of legitimate peripherality provides learners with opportunities to make the culture of practice theirs.

Joe learned all the facets of the everyday life of contracting over a number of years. He learned the talk and the walk of participation, to mastery level. "I eventually became self-employed with my own machinery" (at approximately twenty years of age).

After several successful years working on his own account, during which he had discovered a love of reading, he decided to

> have a go at studying philosophy. Again I was very frustrated with spelling and writing but the subject matter was I found, very interesting and I was quite surprised at myself in that although all the people that were with me had quite high qualifications – university entrance etc. - they were no better at understanding or grasping philosophy. In fact, they weren't as good as me, so that gave me a lot of confidence. That I could foot it intellectually with them was a surprise. (Joe)

He described this illuminating and insightful experience with great humility, adding that while he never completed the qualification:

> One of the professors told me that I had the ability to philosophise in an original manner. I'd come to that conclusion myself anyway but coming from him it did carry a bit of weight (Joe).

This was a critical point in (HP) Joe's personal history and to a large degree repaired the dispositional damage towards learning from his soul-destroying schooling.

> After I left there, I had a lot more confidence in my intellectual ability to do things. Also the nature of the subject I learned, allowed me to look at things in the big picture so it was a very worthwhile experience for me. (I) was required to think of the nature of human experience, the nature of learning, how we come to know things, how all wisdom and knowledge is built on each other and that its continually evolving. (Joe)

After eighteen months, he left the tertiary course uncompleted but having learned the ability to think critically. His disposition for learning was developed by being immersed in this particular culture of practice, within a sociocultural community that valued him as a legitimate participant. This community recognised what schools had failed to do; that he knew more than presumed by his unclear writing style and poor spelling alone. While Joe enjoyed his period of tertiary study, he chose a change of direction.

> I had this burning desire to go farming, always had had, so (I) did a short stint again at contracting. But the ultimate aim was to go farming or to buy a farm which was something that I thought was impossible and that you had to be born into one or to win a lottery or something to be able to farm. But with the little knowledge that I had gained through my various studies, I realised that it was possible – if one was dedicated enough - to do it anyway. And we got the opportunity the year we married to lease a farm for a year and we were lucky enough to purchase the farm the next year. We had no help financially – it was almost all borrowed, but we got the opportunity and the bank took a gamble on us, which came off and we were able to grow the business over the years. (Joe)

Joe then started farming with very little technical knowledge of the practice.

> My farming knowledge was reasonably non-existent...I certainly didn't know a lot. So learning was a top priority. So I learned off neighbours, friends, associates, - MAF (Ministry of Agriculture and Fisheries) advisors were very helpful, - and reading any farming magazine or paper or anything I could get my hands on. (Joe)

Learning in practice

In a range of critical incidents, Joe (HP) repeatedly describes his process of learning farming as a 'mature-entry' 24 year old, as being dominated by:

- Observation
- Experimentation

- Questioning
- Reading
- Seeking advice

> You can pick up the day to day stuff, you make a few mistakes but you can pick it up. Being a thinker and seeing the big picture view of things and how you handle ups and downs (is more important) – doing the right thing and asking, are there different ways of doing it? (Joe)

This he believes was learned from being well rounded and from his short and incomplete period of tertiary level study; the experience as well as the content. This supports the view that dispositional abilities are socially constructed and important for processing usable knowledge.

4.6 University degree, science and practice - Ben

Ben, similarly to Joe, (HPs) never grew up on a farm. He was introduced to the culture of farming through weekend and school holiday visits to his Grandfather's farm, which was on the outskirts of the city in which Ben lived. Ben recalls from a very young age knowing that he wanted to be a farmer. This strong attraction to farming manifested itself when as a student at a city high school, where there were no direct references to farming in the school programme (unlike rural schools), he developed a personal focus on science.

> I enjoyed science very much and that was my strongest area in school, so I wanted to relate that to farming. (It was) probably, the biggest hook up if you like to my love of farming. So that's why I went on to do an Agricultural Science degree at Lincoln University.
>
> I even got farming subscriptions when I was at High School to 'The Farmer' and those sorts of agricultural magazines and [by organising this himself], getting all that (knowledge) from outside of school. (Ben)

Farming Employment

On leaving school and prior to entering tertiary study, Ben worked for one year on a sheep and beef property, followed by a second year on a dairy farm. While this was not a requirement of his degree, it was chosen for a combination of experience of farming, living away from home and as a break from studying.

At this stage, Ben called on his experiences on his Grandfather's farm and also latter experiences on an Uncle's farm. He also relied on his self-directed learning from reading farming journals.

> I guess I learned through my grandfather's teaching quite a bit. A lot of stuff I had read about and I knew what happens but I hadn't done it. So I had that in the background and (was faced) with the practical doing – learning. (Ben)

In his first farm employment, he:

> Worked mostly on my own ... doing a lot of tractor work so I learned a lot. Something I always wanted to do. (I) worked hard and did a lot of hours.

Ben recalled a critical incident of setting up the drill for sowing a paddock.

> Basically he (the owner) showed me. The farmer taught me anything I needed to know but its surprising how much you pick up through reading a lot. I knew all about what rates things were grown at before I got there – how much you sowed but I just *hadn't actually done it.* (Ben)

This reading was all self-directed from personal interest.

> Oh yeah. Farming was everything to me ... It was my main interest.

From a very young age, Ben (HP) showed a high level of motivation, interest and ability for self-directed learning. As a novice entering a guided learning position, he had constructed a depth of propositional knowledge mainly through reading, which he then proceduralised through practice on-farm. This may be a reflection on his smooth transition and overt success at school; to a level of gaining a B Bursary. This academic success was not emulated by any of the other farmers in this study with no school leaving qualifications achieved.

The reasons for this difference are an area not covered in this present study but raises many questions regarding city v rural schooling, although one gets the impression that Ben would have been just as successful within the rural school system.

There are possible sociocultural factors that may have influenced Ben's focused self-directed ability; his disposition for self directed learning. According to Prawat's

(1989) theory, it could be said, regarding farming, that he demonstrated a disposition for mastery, seeking to construct knowledge out of interest and a *desire to know* as opposed to learning primarily for performance or passing assessments. His hunger for knowledge of farming was his drive for learning.

At his first farming position, Ben often worked alone as the farmer worked with his stud sheep, "so he tended to get me to do all the tractor type work – that's just the way it worked." His second job on the dairy farm was similar. He saw the owners as good role models as:

> They were very hands-on and had been very successful getting where they got. So I took that as a good thing to learn from, I suppose. They had worked their way up through sharemilking. And I got the practical side again even though I knew a lot from reading, but the practical is different so it was good to get that confirmed. And also to get the finer points (on) what I needed to do. (Ben)

Ben described employment positions that required specific, routine skills to be learned, tractor driving and milking cows, rather than an overall training for a farming career. As these positions were prior to his university experience, the major objectives were to experience in practice that propositional knowledge, which Ben had learned from reading while being introduced to the cultures of practice. This confirmed for him his commitment to agriculture as a career. The value of sociocultural immersion heightened his ambition to become a farmer. There was some indication of Legitimate Peripheral Participation within the second position:

> I got to the stage there where I – like I do to young fellas who work for me. You ask them, "how much grass is there? Is that enough? Are they going to get enough feed?" - 'till they get past that stage and they can go away and run the pasture for a few days or a week.

University Study

Ben (HP) completed a BAgSci (Hons) degree over a four-year period. He doesn't see the major importance or value of his degree as being what it contributed to his practical farming but what it meant to him personally and how it changed his thinking.

> I always wanted to do it ... I liked science and the BAgSci was the premier degree, and I wanted science and farming, putting the two together. So that was probably 50% of the value of that Lincoln thing. Probably 50% I've used in farming - the *knowledge or way of thinking* that I gained from that for my farming (was more important). So it was two-fold: the personal thing and achievement and I think the main thing I got was the way they teach you to think in the sciences. The way you set out a scientific way of looking at something – that's the biggest thing I got from it, I think ...
>
> If you say something you must be able to validate it and ... come up with evidence. Just in the way that you think logically through things – that's probably the biggest thing that I've applied to farming 'cause farming is full of problem solving ideas to look at.

Ben has carried that critically analytic approach through his farming career, along with his reflective practice and research skills.

Learning in practice

After a period of travelling overseas, Ben returned to dairy farming where he continued to learn through practice. Major points in Ben's learning in and for practice are his:

- Self-directed learning ability
- Critical and reflective thinking skills
- Ability to seek scientific reasoning
- Learning from reading
- Learning from 'doing'

He is selective in his sources of knowledge, respecting experienced and successful farmers equally or more highly than farm consultants and other advisors. He considers that farmers are often more genuine in their responses than consultants, who often have other agendas.

> All consultants do is gather information off everyone else and then sell it to you, that's what they're paid to do - is go out there and filter it all. That's where I see their role. That's why some people are reluctant to talk to them because they've got a good idea and they just grab it and sell it as their own idea (Ben).

While Ben appears to be more individual in his approach to learning, he is an active participant within various communities of practice, many members of which he has maintained an ongoing relationship of mentoring or peer support. He continues to be

enculturated (Brown, Collins & Duguid, 1989) into farming practice through participation and interaction within these communities of practice; a sociocultural source of learning through practice.

4.7 Conclusion

In this chapter, a diverse range of personal histories and pathways into farming practice have been explored and analysed in relation to theoretical perspectives. Differing communities of practice and their contribution to sociocultural construction of knowledge have been identified and analysed. Chapter 5 (part two of the results and analysis) identifies emergent themes, patterns and relationships that contribute to learning in practice and to the knowledge bases of the farmers, as practitioners. Links to theoretical perspectives are identified and discussed.

Chapter 5

Themes, Patterns and Relationships

5.1 Introduction

This chapter presents the second part of the results and analysis. Emerging themes patterns and relationships are interpreted through theoretical perspectives, synthesising learning data and in particular the analysis of critical incidents. Characteristics of higher and lower performers are identified and knowledge required for mastery is discussed.

It consists of seven subsections as follows:

5.2 Farm discussion groups

Farm discussion groups are groups of farmers who meet on a regular basis, usually once a month, with the objective of having a practical, on-farm learning session. Usually five hours or so are devoted to an in-depth observation and analysis of one member's farming practice. Sessions start with a breakdown and discussion on any topical issues on individual members' farms. The farmers then drive and/or walk extensively over the host's farm, stopping to discuss points of interest or issues of practice on which the host farmer would like ideas or possibilities for improved practice. The host farmer plans a programme according to his/her needs and the interests of the group; new technology is a major focus. All members contribute analytically to issues arising in a rich two-fold learning experience. At times field trips are organised where non-members' innovative farming practices are visited, for the specific purpose of gaining new knowledge.

5.2.1 Cross-case analysis of participants' experiences

Five of the six farmers in this present study are (or have been until recently) members of farm discussion groups, with Max being the exception. These five farmers have had a range of experiences as members of various groups.

The two dairy farmers, Ben and Colin (HPs), have been members of dairy discussion groups. They referred to the group 'owners' as LIC (now DEXCEL), the dairy industry extension service. They both found the groups very useful at the beginning of their careers:

> Got a hell of a lot out of discussion groups. (Colin)
>
> I thought they were good because I didn't know a lot. I suppose I was learning all the time. (Ben)

They described a wide range of changes made in their earlier years due to their involvement in the groups:

> Grazing rounds, fertilizer applications, when we put it on, types of fertilizer, possibly thousands of things – breeding policies, calving dates ... (Colin)

> Main thing learned was grazing grass, how to do that properly – it was the major thing I was wanting information on. (Ben)

These dairy discussion groups are arranged by the dairy industry and hosted by local farmers. Both Ben and Colin have ceased their involvement with their dairy groups in which previously they were leaders.

> Its not important anymore... Initially they were good ... You need good people to run them ... Its almost an area that has fallen down a bit. Discussion groups are poor. And they go around and around over the same crappy old arguments that people talked about ten years ago ... (We've) tried to bring up new topics, just come up with a radical new idea and just get into that and people would say – ohh, you can't do that ... To me it's a place you should go to talk about new ideas ... Its **not a discussion group,** its just put up your facts and what your production is and so on and – oh I can't be bothered with it. (Ben)

Colin had a similar frustration with his dairy discussion group which he has stopped attending.

> Actually (two of us) were asked to leave one ... they reckoned we were too intense and too critical ... all that sort of stuff. And I think it was bullshit myself – discussion groups are not a pat on the back, saying how good a guy is - its an education day. And I've always had the attitude, if someone is doing something that I'm not doing, I want to know *how* they are doing it ... Finding out what I want to know - sometimes it does become critical, asking questions and (probing) people. (Colin)

When asked what was the source of this problem, Ben thought the focus was probably wrong and that maybe the local farmers are getting too set in their ways.

> No one would ask, 'why are you doing that production? Why have you got that many cows on?' All those basic things that people can learn from but there are people doing things differently and no one bothers to ask you why. (Ben)

In probing why the group members are not asking these questions, Ben thought that it was the people involved, both the farmers and the facilitators, (but mainly the facilitators).

> It should be the farmers taking control – its actually LIC and the trouble is, well, this is not very nice but LIC is pretty much a propaganda machine for the dairy industry. Its what **they** think, not the latest thing from Ruakura (research). It comes out through their system. (Ben)

In contrast to this experience of dairy farm discussion groups Joe, George (HPs) and Henry (LP) all belong to sheep/beef/deer farm discussion groups. They have had mainly positive experiences with their individual groups:

> It's a very valuable tool. We get input from up to 18 or so farmers about the way they do it and uh, so its most important. There is an element of people there who are frank and honest and they set the tone for most of the discussion that goes on. And I think the honesty, when we are talking about farming, because we are all (involved and active) farmers, has a ring to it that – its obvious that you're getting the good oil. Its enjoyable *because* the people are frank and honest and because the facilitator draws that out of people. Not all his ideas are accepted but that's good. It adds to the debate. Issues can be talked about without personalities becoming involved or affected. I think people will – if they've made a decision that turns out to be a 'bulls up,' will throw that into the melting pot also – often in a humorous way. Its probably easier to deal with it in a humorous way, isn't it? (Joe)

> Probably (the group's) attitude is important – people need to be open and willing to discuss things (honestly). We are a fairly diverse group (and) we've got some good questioning brains amongst the farmers. [they often disagree with the facilitator]. It makes it easier if you've got a good rapport – I feel we have. Generally some really good discussion happens and if you've got your eyes and ears open you'll come home with something that has made you think. (George)

This has often led to changing practice for these higher performing farmers.

Henry (LP) has had mixed experiences with his farm discussion group, describing it at times as too challenging for him. He would favour a more supportive and less challenging group dynamic.

> My opinion of comparisons is probably that it tells you how you are going but ... I believe that for those that are struggling (comparisons) put them down and I don't think that's a good thing. Comparisons should only be for purposes of 'okay, maybe you could do a little better.' It shouldn't be there for basically, 'okay we've got someone a way up there and you're a way down here therefore you're not any good and you're not going to make it' ... because more harm can be done to the farmer that's finding it a bit tough going at the time. (Henry)

Henry's views describe a need for him personally, to have continued scaffolding in order to protect his disposition for learning (Katz, 1993). This risks over protecting a member, who then remains unchallenged to "forge a new identity" through a learning process "full of loops and discoveries" (Ibarra, 2000, p.153). Being prepared to move outside one's own comfort zone is identified in this study as important for rich learning to occur. Those (Henry and Max - LPs) who find critical analysis of their practice too uncomfortable, are slow to adopt new practices.

From the data, it is apparent that issues of group ownership and membership are important for group effectiveness. Because the dairy discussion groups described are fluid and open for membership, a wide diversity of age and experience is found in

most groups. They can consist of a mix of farm owners, managers, senior staff members and novices which presents difficulties, as all these groups have differing and competing needs.

In contrast, the sheep and beef groups are farmer owned and farmer directed, with a facilitator employed to facilitate the group and to bring with him or her a wide range of contacts, knowledge of new research, and shared experiences of other clients and client groups. This extension to the group members' resources is of crucial value in employing a farm consultant as facilitator.

It was noted that the dairy farmers referred to discussion 'day' whereas the sheep and beef group members referred to discussion 'group.' This seemed to be an indication of impersonal detachment versus personal attachment, which may be a reflection of lack of identity and ownership or possibly a lack of permanence, by the dairy farmers in this study.

The following participant observations give both support and another perspective to these experiences.

5.3 Participant observations.

5.3.1 Sheep and beef farm discussion group

In the selected sheep and beef discussion group observed as a participant, the fourteen participants present were all farm owners. The sheep and beef group was owned by the farmers who pay for the full cost of employing their group facilitator. There was a committed approach with information given freely and experiences freely shared. They were often self-critical and reflective. The participants exercised reflective practice in summarising their own practices and critically analysed what happened and why. This led to other similar or different experiences being contributed from other group members. There was generally balanced contribution from the farmers with no individual dominating the discussion. They

were able to carry the one slower member and ask the critical questions that he was not asking himself. This was done non-aggressively and with some respect but still critically. There was evidence though, later in a personal conversation that this participant had taken the criticism personally.

There was great group cohesion, which was adhered by a fluidity of humour – a specific humour that would be lost on those outside the culture. The group benefited from a group 'clown' and others with a ready wit. This cultural 'trait' appeared invaluable for group dynamics.

A mix of good and better operators were facilitated by the consultant in a non-aggressive and non-confrontational way while remaining critically analytic and challenging. Rich stories flowed in a very honest and forthright manner and there was an uncanny intuitive communication and rapport. The farmers understood what wasn't said as well as what *was* voiced. All members had a contributing role in the dynamics; the blunt member, the clown, the one who asks the unsure question or gives the unsure answer and the one that plays the devils advocate. All are given legitimacy. The ideas flowed, (Prawat, 1989) often with demonstrations of original thought. These ranged from wild dreams, which at times developed to possibilities, to more practical solutions. Diversity enabled the group to draw on a wide range of masteries.

The facilitator was corrected at times or asked for evidence of research quoted and on one occasion the validity and reliability of such research was challenged.

Language was clear, open and descriptive – a display of rural culture while exploring the issues in a very practical way. For most participants, there was an obvious interest, receptive attitude to new ideas and a thirst for knowledge underpinned by the committed group ownership by the farmers. A couple of people stayed on the periphery but joined in when discussion went their way.

5.3.2 Dairy farm discussion group.

The dairy discussion group consisted of eighteen farm owners, sharemilkers and staff members. In comparison to the previous group, the group of dairy farmers were more individual. They formed several small groups rather than coming together as one. This may have been due to new staff members being present, as many of the group members didn't seem to know each other. This probably contributed to the limited and wide range of responses.

The facilitator/consultant and two experienced farmers were dominant in the directing of the group. They all asked younger members questions regarding pasture species and quality, referring to their own farms for comparisons. It appeared to be more a test of knowledge rather than one of discussion. In contrast to the previous group, humour was not a feature, with the group conducted in a more serious vein. There was an obvious range in levels of understanding and knowledge of the field discussions. This resulted in a conflict of purpose of the groups activities. There was a lack of spontaneity and a definite atmosphere of transfer of knowledge, although the session was participatory. Due to limited time, the session was more focused and moved quickly as it needed to finish before 'milking'. There was a partial farm walk with stops to discuss certain facets of the farming practice – mainly pasture quality and assessment, with some condition scoring of cows and discussion on aspects of animal health.

The group dynamics were vastly different from the sheep and beef group. These differences are mainly in attitude and group culture. Identified differences are summarised in Table 5.1.

Table 5.1

A comparison of two farm discussion groups

Dairy	Sheep and Beef
Rapport lacking	Good rapport
Industry owned	Farmer owned
Facilitator directed	Farmer directed
'Free'	User pays
Open membership	Closed membership
Fluid attendance	More committed attendance
Non-cohesive	Cohesive
Owners, Sharemilkers, Novices	Owners
Teaching	Learning
Serious focus	More relaxed focus - humour
Some dominant members	Equal membership
Business	Business and social
Overtly competitive	Quietly competitive

The wide variance of age and experience in the dairy group didn't work, as the dominant (experienced) farmers assumed the role of *teacher* instead of *participant*. This resulted in frustration by both sectors of the group i.e. those experienced as well as those newcomers to the industry; a confusion of roles. There was tenseness at one point when a novice disagreed with a master about 'factual' knowledge. The facilitator intervened but the group by then had formed two factions.

These participant observations support the views and experiences of the farmers in this current study and may reflect a difference in sub-cultures and the subsequent differing needs. As dairy farmers require more staff than the sheep and beef farmers, there is a need for different groups to cater for the different levels of experience.

This observation revealed a wide variance in needs, between the novices and those more experienced.

5.4 Role of women

Data from the farmer interviews revealed an ambivalence regarding the value and importance of farm women as partners in the farming business and in the organisational knowledge of the farm.

In the cases studied, the farm as a community of practice consists primarily of the farming family and particularly of the husband and wife as partners. As researcher, I was left with the dominating impression that the farming women are still fighting for visibility and for real recognition of their contribution to the wealth of knowledge of the farming enterprise. The overwhelming impression given by the farmers was that their wives are a good support and according to four of the cases, "a good sounding board." It appeared initially that the women's role was still as a supporter and a somewhat peripheral participant in the farming business. With some supplementary questioning though, it became obvious that the women are very much involved on-farm and in farm management.

As Joe put it:

> (My wife) is not heavily involved in the day to day 'doing' but is heavily involved in decision-making and in the accounts side of farming.

With further questioning the physical nature of her work emerged. She is regularly involved in routines like tailing, drenching cattle and sheep, shifting stock, weighing cattle, works the dogs, mothers-up ewes and lambs, drafts sheep, and a full range of animal husbandry, farm management and decision-making practices. When an inquiry was made as to whether she rode the ATV (All Terrain Vehicle) about the hills, the answer was,

> Well of course. She has to be able to do that to shift stock – its just part of the deal.

He considered this was 'a given,' and that all farm women would do that as part of their role. This attitude is common to the farming culture and the expectations including gender roles, that while changing, are still deep-rooted. It doesn't mean that the women are unvalued though. "In fact," he added, "she can do most things day to day if she needs to, but she has other (off farm) commitments at times."

So we progressed from a peripheral role for his wife, to the description of a full participatory role in which Joe gave his wife 10/10 for importance.

> I don't think the actual sharing of the (physical) workload is that important but to have someone who is tuned into the same wavelength regarding where you are going and some of the decisions sort of monthly, yearly, five yearly decisions – you just can't stress (enough) the importance of that. Its got to get 10/10 for importance.
>
> You can sound out some of the ideas you've got. Collectively put some new ideas into the scheme. And if both parties have got their own individual skills (and use them) we can reach a conclusion (and) we can be happy that we've covered all the bases. And its worth taking the risk on doing something which if you weren't sort of both heading in the same direction or thinking along the same lines, it would be a far more difficult thing to achieve. (Joe)

This was quite typical of the responses from the farmers, with Colin describing his wife as being more involved in the daily running of the farm when she was younger. He concluded that:

> I think she has generally got a pretty good handle on what's happening but she wouldn't know how to go and treat a cow for mastitis – she doesn't have to. But she would know enough to run this farm if I died tomorrow ... (I think) that you probably don't really recognise the amount of knowledge that your wife has. (Colin)

As the wives have gained some freedom from family responsibilities, they have developed other interests of further education, off-farm work, or in one case, running a small business independently. Kilpatrick & Bell (2000) refer to SCARM (1998) who recognised that those women who work or who have worked off-farm bring with them a range of valuable management skills. The very resourceful women in this present study, all wives of the cases studied, are a powerful asset to the farm practice. They contribute to the high performance of both the farm and the male farming partner. The higher performing farmers in this present study appear to have more confident, well-rounded, resource-rich wives, who contribute to the farming enterprises in a multi-faceted way. Through their varied skills, they add to the diversity of the community of practice and success of the business. In addition to

their varied roles, these women can be considered legitimate farmers in their own right.

Reeve & Black (1998) found a traditional approach to gender roles within both domestic and farming work. While this may be the initial view of farming men, this present study may question whether that superficial impression is in fact the reality. While the women may not be digging in fenceposts and other major physical work (often seen as real work) they are fully involved in the general 'life' of the business.

The women's other interests, careers and business contacts, have added to both Joe and Colin's farm performance levels. Their wives are both challenging, independent women while still being their greatest supporters. This combined with the on-farm work described, makes them a very important influence in the farming practice.

Claridge (1998, p.183) in a study of rural women, found that "women bring to decision making and leadership, their specific attributes and skills, and these skills are valuable," and that "rural women have little or no public power but considerable *private power.*" This impression was certainly gained from the two older women (wives and business partners of masters) in this study. It could be said that they have developed a breadth and depth of expertise and have considerable influence in farm decisions and leadership within their practice.

Kilpatrick and Bell (2000, p.2) refer to Alston (1995) and Teather (1998) who concluded "that Australian women farmers are undervalued and are often ignored when strategic farm management decisions are made." The present New Zealand cases studied would not support the view of being ignored, as all farmers agreed that their wives are fully involved in decision-making although, as described there is a tendency for the men to undervalue and take for granted their wives' contributions and involvement in the farming practice. (This study didn't seek validation from the women involved to seek their views on this interpretation.)

Therefore, women contribute to the learning of the organisation and community of practice through:

- Practical involvement

- Support – "a sounding board"
- Diversity of skills and viewpoints
- Social and human capital
- Sociocultural interaction
- Critical analysis – challenging possibilities
- Decision-making

5.5 Practitioners' knowledge bases

5.5.1 Mistakes and failure as learning in practice

While the lower performers avoid risks at least partially in order to avoid failure, the higher performers view mistakes or failures positively.

> Failures, - it depends on how you look at them. They can be failure and you want to get rid of them pretty smartly, but there's also many positive things in them. And that can add to your *store of knowledge* and help next time. You certainly don't want to dwell on them – that's done - finished – gone and on with the next thing. (Joe)

And

> I don't say its failure; mistakes aren't failure – its *part of learning*. Nothing is failure – its frustrating that you've made a mistake and (think) how are you going to handle it. Its okay to make a mistake once but ... you've got to learn to overcome it. (Colin)

They bracket risk-taking, decision-making and moving outside their comfort zone with coping positively with failure, as one often goes with the other. All the higher performers find risk-taking stimulating and challenging. As Colin put it

> I have this term that every time I get up on my knees, I put myself back on my backside. As soon as you get up and comfortable again you do something else ... I suppose it's a mindset but if you want to survive in life and achieve (you) can't do it comfortably. (Colin)

And Joe recalled the value of working alone and having,

> time to philosophise but (then you) have to have the ability to step outside your comfort zone and put it into practice – thought out and thought through. It needs a bit of imagination; an ability to visualise it happening.

These higher performers are 'ideas people.' They are continually looking for possibilities as opposed to solving problems. They enjoy the challenge of looking for new ideas or possible options. Joe called this "great fun – like being a detective." This supports Prawat (1989, p.5) who proposed an idea-based social constructivism, where "the focus is less on *problems* and more on *possibilities* inherent in a given situation;" a transformative view of experience as education.

5.5.2 Local knowledge

Local or traditional knowledge (Richards, 1994) has always been (and remains) important to both Max and Henry (LPs) in their mode of farming and choices made. Importantly, Joe (HP) noted that he learned his local knowledge from neighbours, books, and advisors but that he needed to be bigger than that knowledge, in order to rise above it and look at possibilities (Prawat, 1989).

> Some of that *local knowledge* you're better not to know because it predisposes your train of thought. So if you haven't got it then you can think without being encumbered by so called *local knowledge*. Its important but ... you *thinking* about it is more important. Its good to know but then its got to be put under scrutiny. ... You need to challenge your beliefs. Just having the nouse to actually not be bound by convention and think 'how can this be solved some other way,' or maybe it has to be solved the traditional way, but maybe not. (Joe)

He used the term 'open-minded' which he thinks is the prime ability needed to be a successful farmer. Asking questions, experimenting, reading and keeping up with the latest research and development through specialist field-days and workshops, combined with being prepared to make mistakes, are practices he sees as encouraging an open-minded attitude; always looking for new ideas.

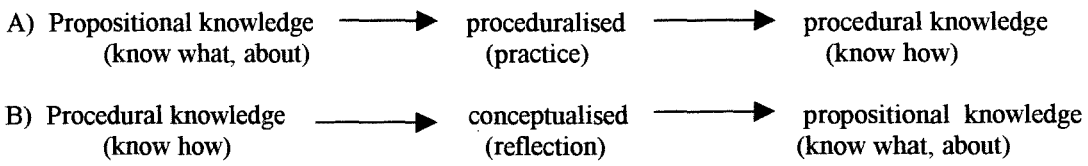
5.5.3 Fluidity of knowledge construction - higher performing farmers

By mapping pathways, an attempt was made to identify methods of constructing the different aspects of knowledge. No definite pattern emerged for the higher

performers with similarly fluid processes occurring, to construct knowledge either through practice and 'knowing how' or through reflection and propositional means, 'knowing what' (Figure 5.1).

Figure 5.1

The higher performing farmers demonstrate a fluidity of knowledge construction moving readily between the following two processes.



Examples of the many learning practices strongly exercised by these higher performers, are reading and experimenting, observing and questioning. All four cases read avidly, they are hungry for ideas and to learn of new research or innovative practices of other farmers. After critically analysing critical incidents for mapping of knowledge pathways, the pattern that emerged was one of fluidity. They have the ability to learn from either seeking propositional knowledge (through reading, specialist field-days and workshops, discussion groups, advisors or others) and then proceduralising it to automaticity (procedural knowledge) *or* by "just doing it", experimenting, practice, trial and error, and consequently through reflection, observation, reading and social interaction, constructing propositional knowledge (Figure 5.1).

This fluidity of knowledge construction from the

- 'know what' (propositional knowledge) to 'know how' (procedural knowledge)
- factual to practice
- memory to automaticity

and the reverse process, may be due to the practitioners' ability to think in a deeper conceptual manner and to research for knowledge. Schön (1983; 1987) referred to learning through practice, more commonly from 'doing' and interacting, with the workplace environment. These farmers as practitioners interact with a full range of artefacts, which contribute to this fluidity of knowledge construction.

They are proficient at:

- Searching documents
- Questioning
- Critically analysing
- Experimenting
- Reflective thinking
- Searching out new science
- Thinking conceptually.
- Participating socioculturally

This allows them as experts to confront problems on the job, think them through, consider possibilities and come up with solutions or improvements. They don't see 'mistakes' as failures but as challenges. This learning occurs often through everyday work activity coping with needs as they arise.

5.5.4 Comparison with lower performers

Those lower performers, also expert in some fields but at a lower-order level, are unable to approach 'problems' with such philosophical attitudes. They lack the disposition for risk-taking and decision-making, which tends to limit their vision to the smaller picture and any perceived drawbacks. They have less fluidity in cognitive construction, with a strong preference to keeping to familiar practice with which they feel comfortable. They are insecure when attempting to proceed outside

their comfort zone, which leads to only partial adoption of any new practice and often at the stage when the new practice has become accepted everyday practice. Their knowledge remains at a lower-order level and they strongly favour (B), (Figure 5.1) in working from a practical base.

An example of this difference in depth and breadth of knowledge was revealed in the discussion in interviews, of how the subjects learned to grow and manage grass. Henry thought it was "a strange question" and then replied, "generally it just grows with sun and water and some good fertilizer" while Max "learned by experience – just picked it up." These lower performers only saw the small picture.

In contrast, the higher performers spoke of new technology and the importance of keeping up with new practices. Ben replied that it was really harvesting the sun and described an ongoing learning process of the technology of growing new grasses and managing pastures effectively. George talked of learning from watching other good farmers, and seeking advice from farm consultants who have a broad range of client experiences to draw from. He is always experimenting, "working out new recipes" and he is continually learning for this evolving practice. Joe said,

it's an ongoing process with the accelerated pace of technology (and) I don't think that, - well, I hope that I never learn it all – its always evolving.

Data were analysed to identify comparative characteristics of higher and lower performing farmers. The summary of these characteristics (Table 5.2) supports the discussion above.

Table 5.2 tabulates a range of characteristics, mainly dispositional factors which are conducive to higher-order knowledge construction. The key point from this data is that the higher performers not only 'have the knowledge,' but they also use it i.e. they operate at a very high level consistently, due to these characteristics. It is a key observation that they are proactive in seeking new knowledge.

Table 5.2

Characteristics of higher and lower performers – a comparison

Higher performers	Lower performers
Operate at higher-order: • Propositional knowledge • Procedural knowledge • Dispositional knowledge	Operate at lower-order: • Propositional knowledge • Procedural knowledge • Dispositional knowledge
Use wide range of advisors	Reluctant to use advisors
Recognise learning situations	Oblivious to learning situations
Are stimulated by managed risks	Avoid risks
See possibilities	See problems
Seek innovators and leaders	See innovators and leaders as privileged
Are enthusiasts	Are accepting
See farming as a business and a lifestyle	See farming as a lifestyle
Are hungry for challenges and ideas	Cling to traditional knowledge
Create discomfort	Seek comfort
Work hard at being smart	Work hard routinely
See selves as professional	Unsure of professional status
Value university education	Value lower levels of education
Actively seek new science/knowledge	Learn mainly from own experience

5.6 Evolving identity - identifying with masters

The masters and emerging masters, with their rich constellations of communities of practice, are resource-rich (see Chapter 6, Figure 6.2). They have a wide range of experiences and knowledge to consider within their range of possibilities. They identify with other masters.

> I get a hell of a lot from looking over the fence. (I) pick on people. I've always been one to associate with farmers that I consider better than myself – not the wallys and there are some wallys out there – not interested ... I've always made it hard for myself. (Colin)

Joe spoke of going to the monitor farm field-days:

> You meet people there that are thinking along the same lines as yourself. You meet people who are at the forefront of this particular technology – you've got a lot in common with them – we're all thinking originally and wondering how we can apply this technology to our particular situations, so we bounce ideas off each other. Just natural really, isn't it? (Joe)

Ben and George both spoke of seeking out like-minded people and people who are interested in improving practice.

Joe and Ben reflected on the isolation at times, of finding stimulating people with whom to relate.

> You find you are batting on your own a bit. In some instances, some of the conversations are a little less enjoyable in that you're hoeing over old ground that you've been over and you're not going back again. (Joe)

Ben actively seeks out 'thinkers':

> ... like-minded people - they're not easy to find. (For me) they are a mix of people with different educational backgrounds and different ages e.g. some who left school at fifteen but they have enquiring analytic minds. They are ideas people. (Ben)

Changing identities are intrinsic to the challenge of being open to new knowledge and innovation, which Joe described as:

> Being able to scrutinise all the things you do and question your beliefs – throwing out some of your treasured beliefs. (Joe)

5.6.1 Knowledge, skills and attitudes identified for mastery

In interview the farmers were asked what knowledge, skills and attitudes they saw as necessary for farmers to be successful. A comprehensive list was compiled from their answers. Independent of this list, interview transcripts were coded to identify knowledge and dispositions demonstrated by the higher performing cases, when

learning in and for practice. These two lists emerged as being almost identical and as such, supported the refutability principle of Silverman (2000) in which,

> one solution to the problem of anecdotalism is simply for qualitative researchers to seek to refute their initial assumptions about their data in order to achieve objectivity (p.178).

It also shows a level of consistency in interpretation between the farmers' knowledge, how they related it in interview, and how it was interpreted through analysis.

Figure 5.2 uses data drawn from both lists and portrays knowledge, skills and attitudes exhibited in successful farmers. While the list has been tentatively categorised under the three headings of propositional, procedural and dispositional, these concepts overlap considerably. For example, the most quoted ability cited by the cases for success was *resilience.* The question then arose in analysis of, 'how is resilience demonstrated?' In discussing this with the farmers, it was decided that one example of how resilience is demonstrated is not only **surviving** extreme climatic conditions but by farming positively through such conditions and actually **progressing in practice**. For this to occur propositional knowledge is required in order to know 'what' to do, procedural knowledge is required i.e. to know how to do 'it' and dispositional ability is required in order to make the decisions and to take the risks required i.e. to put the knowledge into practice.

For all of these abilities to occur the practitioner needs to use a wide range of resources including:

- Reading
- Observing expert farmers
- Approaching and listening to 'outsider' experts and advisors
- Experimenting,
- Sharing experiences at discussion days, specialist field-days and workshops.

While this is not an exclusive list of resources employed, it gives an indication of the extensive range of sources of knowledge. It was attempted in analysis to

identify modes of sourcing the "know what', the 'know how', and the dispositional ability required. Again, it was revealed that the wide range of sociocultural modes was required for all forms of knowledge to be constructed.

The following knowledge skills and attitudes (Figure 5.2) are identified by the cases in this study as essential for success in farming. All were identified at higher-order level in the higher performing farmers while only at lower-order level in the lower performers.

Figure 5.2 Knowledge, skills and attitudes identified as essential for success in farming:

Propositional/Declarative (knowing what, that,why)	**Dispositional*** (enabling use of knowledge)
•Animal Husbandry •Agricultural Science **Procedural** (knowing how) •Range practical skills •Organisational skills–systems, strategies •Management skills •Financial/Business skills •Research skills & reading	•Questioning •Resourcefulness •Social learner •Individualism •Open-minded •Decision-making •Risk-taking •Copes positively with failure/mistakes •Comfortable with success •Moves outside comfort zone •Proactive •Peripheral Vision (big picture) •Drive/Motivation •Resilience •Adaptability •Love of Farming •Self-directed Learner •Communication •Critical analysis •Reflective practitioner •Active continual learner •Observational skills

*** These dispositions are further categorised into dispositions for rigorous thinking and rigorous practice in Chapter 6, Table 6.1.**

5.7 Conclusion

In this chapter themes, patterns and relationships have been presented, highlighting linkages to current theory. Cross-case analysis has identified contributing factors for knowledge construction and for evolving identity towards mastery. Comparisons between lower and higher performers' knowledge and characteristics have been explored. These are further developed in Chapter 6, which discusses the major findings in relation to theoretical perspectives, and explores subsequent emerging theory of knowledge construction.

Chapter 6
Discussion

6.1 Introduction

The purpose of this chapter is as an extension to the analysis and synthesis of data presented in Chapter 4 and Chapter 5. It discusses major findings in relation to theoretical perspectives and subsequent emerging theory.

In analysing this inductive research, the aim has been to explore the personal ontogenies of the cases studied (within the limitations of this research), in order to discover linkages and to identify, develop and relate inductive concepts, to theory. Through this process, theory emerges as concepts are related to theoretical perspectives, to a point of saturation. This research is a study not only of the six people studied but also of multiple incidents within their experiences (Creswell, 1994). McCracken (1988, p.50) suggests that data analysis and discussion "must be fertile, so that it suggests new ideas, opportunities for insight."

In this chapter fertility, new ideas and insight are sought. Major concepts and related theory are discussed in relation to the research question of how these farmers learn in and for practice i.e. how they construct knowledge.

The structure of the chapter has the following eleven subsections:

6.2 Situated learning theory

Situated learning theory explores the relationship between learning and social situations in which it occurs. Lave & Wenger (1991) developed a situated learning theory based on sociohistorical apprenticeship models. This theory doesn't relate to the official apprenticeship programmes practised by many of the 'trade' industries but to a common process experienced by many cultures, in which the *novice* learns from the *master* in a situation-specific context. The knowledge gained by the learner is not abstract but relevant, current and productive. The learner is supported or scaffolded during this extensive period by the expert, while practising in conditions of legitimate peripheral participation (LPP), within a community of practice (Lave & Wenger, 1991). LPP is legitimate guided learning with fading of support as expertise develops.

6.2.1 Situated learning theory v situated activity

Because a person works with others in a task oriented situation it does not mean that they are participants in a sociocultural community. A sociocultural community of practice requires legitimate participation, transparency, empowerment and commitment. Lave & Wenger (1991, p.32) say that *legitimacy* of participation defines a "way of belonging," is a crucial condition for learning and establishes content. In practices where a participant is kept from fully participating, disempowerment occurs, truncating or limiting development and learning.

Historically, farming has played a role in producing the next generation of farmers. Farmers have prepared the next generation by an 'informal' apprenticeship resembling LPP. The process is generally thought to be 'informal' although it is very much a deliberate and formalised process, but often without any official recognition or qualification.

6.2.2 Role of context v transfer

Workplace learning research increasingly recognises context as important to cognitive performance. Many subjects who perform poorly in test situations are often identified as showing expert reasoning in their familiar contexts (Rogoff, 1984; Rogoff 1995; Lave, 1988; Lave & Wenger, 1991). Such research suggests that cognitive skills may not be easily transferred across domains but instead is knowledge specific to context, showing only limited generality to other contexts.

Anderson, Reder & Simon (1996), dispute this context-specific conclusion, asserting that the degree of transfer is relative to the amount of practice of a task and the degree to which the tasks share cognitive elements. They believe that subsequent learning can be more rapid due to procedural elements shared between tasks, although in different contexts. They contend that the emphasis on authentic everyday contexts, (Brown, Collins & Duguid, 1989), is instead a superficial requirement. Anderson et al. (1996) consider that relevancy of material is more

pertinent to the amount of transfer; for example, from a taught situation to a workplace environment.

6.2.3 Transferability of knowledge

This present study has identified a wide range of dispositional abilities required for advanced expertise and mastery (Figure 5.2 and Table 6.1). While further study is required to seek a relationship between these dispositions and transfer of knowledge, a tentative possibility for linkage of these two concepts is proposed.

Joe and Colin (HPs) have been able to transfer knowledge from one area of their working life to another; from one context to another, e.g. from contracting to farming. In addition to propositional and procedural knowledge, Colin and Joe developed a range of dispositional knowledge, which was transported to their farming careers. Other experiences, that paralleled the former working situation, were a concurrent influence. For example, Joe's experience of tertiary study, although incomplete, assisted in his construction of rigorous thinking (Table 6.1), which was central to his successful transfer through mature entry (Figure 6.4) to his new situation.

While these analytic observations of influences in Colin and Joe's pathways are tentative, due to the limitations of this present study, they do exhibit linkages to the theory of Anderson et al. (1996). The subjects practised a range of dispositional tasks in their former contextual situations. Their new situations shared a need for these dispositional cognitive elements, as well as some shared propositional and procedural cognitive elements. There are indications that transfer assisted effective mature entry to their new situations.

In contrast, Max (LP) was unable to transfer his mastery from dog trialing to farming. Although related activities, they lack a commonality of required propositional, procedural and dispositional cognitive elements for mastery. Dog trialing, although requiring skills common to livestock farming has a recreational or sporting focus, which requires a different approach to that required for a business.

This also supports Anderson et al's theory; that there is a lack of shared cognitive elements.

Hanks (1991, p.20), describes a *dispositional* aspect of transfer within contexts.

> The success of a learner changing work contexts, and therefore integrating into new participation frameworks, would depend upon his or her ability to move between modes of co-participation.

He posits that

> The skilful learner acquires something more like the ability to play various roles in various fields of participation ... (the) ability to anticipate, a sense of what can feasibly occur within specified contexts ... It involves a pre-reflective grasp of complex situations ... (with mastery, involving) timing of actions relative to changing circumstances: the ability to improvise.

This supports the analysis of the farmers' experiences of transfer as discussed.

6.3 Individual learning v social learning

In analysing the experiences of the cases, it initially appeared that these men, who as a requirement of their occupation and lifestyle often live and work in relative isolation, must be individualistic in constructing much of their everyday skill and knowledge. (Due to the rapid deconstruction of New Zealand's rural community infrastructure over the last 20 years (Allan, 2000), most of these farmers no longer have a 'local district,' a close and supportive community as existed prior to the political and economic changes from 1984). On further examination though, this theory was dispelled to a large degree. For example, Joe initially learned to fence independently "on the job" and with no instructions from anyone. He described the situation:

> Well, looking at a fence; It was quite easy to look at it and think, well how did they do it? And then put one up – learn on the job and ask questions ... I've managed pretty much with trial and error and experimenting.

In observing other fences on the property, Joe was interacting with his environment and interacting socioculturally. While it may not appear so on the surface, Joe was interacting with the artefacts, the work and prior knowledge of his predecessors,

(old-timers; other farmers or fencers). It could be said that Joe, as a newcomer to farming was being socioculturally transformed through a relationship with various old-timers, in a context of shared practice (Lave & Wenger, 1991).

Wenger (1998, p.64) discusses artefacts and their communicative ability saying:

> The communicative ability of artefacts depends on how the work of negotiating meaning is distributed between reification and participation.

Joe was sharing experience and being interactive, not with the fence itself, but with the practitioners who built the fence. He was, in effect having conversations with them, wondering how the post was strained, how the staples were put in, and how far apart were the wires? He reflected on why they chose that particular fence line, deciding that it would have been due to the need for natural water supply prior to water schemes. The old timers, farmers in abstentia, who built the fence, remain part of Joe's practice through such interaction, although existing in different times in reality. Wenger (1998, p.87) refers to this phenomenon as dual constitution of histories:

> Practices evolve as shared histories of learning. History in this sense is neither merely a personal or collective experience nor just a set of enduring artefacts and institutions but a combination of participation and reification intertwined over time.

As dual modes of existence through time, they interact but exist in different realms. The membership of a person is maintained after a person leaves a workplace or group, while their influence remains (Wenger, 1998).

6.4 Experimenting v researching in practice.

The higher performing cases in this current study, readily experiment almost instinctively, while the lower performers are unaware, even on probing, of any experimenting in their practice.

Both Colin and Joe (HPs) recalled learning on their own in their early farm management practice. They were both considerable novices at this stage.

> I learned through experience, experiment, talking to people and doing. I wasn't in the position to observe others in that I had bought a farm, had sheep, and was faced with physically doing the job myself. So it was from a zero base that I was 'doing.' I would ask neighbours and others what they did with these particular problems and try to apply them - it was mostly trial and error and experimentation. It would have been helpful with a lot of sheep, to have ... had just maybe a week or ten days with someone on a lambing beat where you come across most of the problems and um, just the little knick knacks and how you would handle them. Yes, it would have been helpful. Would have saved a lot of ewe deaths – it was an expensive exercise. (Joe)

And

> Never, ever calved a cow in my life (before). I'd pull the legs out, put the rope on and pull it and I made some mistakes - pulling calves out alive, then having the head hit the ground that hard that the skull broke and you'd think hell! And working on my own ... You soon learn to devise a method for doing it on your own without killing the calf. (Colin)

Schön (1987, p.37) discusses the advantages and disadvantages of entering a practicum and learning the practice on one's own.

> Picking up a practice on one's own has the advantage of freedom – freedom to experiment without the constraints of received views. But it also has the disadvantage of requiring each (learner) to reinvent the wheel, gaining little or nothing from the accumulated experience of others. Apprenticeship offers direct exposure to real contributions of practice and patterns of work.

Both Colin and Joe (HPs) recognised these disadvantages although they both learned fast and learned well. Very soon, they were out-performing the 'locals.'

Schön (1983; 1987) discusses how experimenting in practice may differ from research experimentation, while retaining a *rigor* in on-the-spot experimentation. His research of practitioners identified an initial process that he called reflection-in-practice. The practitioner conducts a reflective conversation with his situation as a way of framing or reframing the particular unique situation that confronts him. This reframing is dependent on the practitioner's *repertoire* of experience; what he can relate to contextually.

Joe described a reflective conversation with his environment/situation when learning to construct a fence. By observing and reflecting on those fences constructed by previous farmers, he then wondered, 'what if I did this differently? Would it work? How could I do it more effectively for today's needs?' He admits to regularly conversing aloud with his environment, dogs and livestock, as he thinks about possibilities.

Schön (1983, p.145) identifies three modes of experimentation-in-practice.

1. *Exploratory experiment*: A "probing playful activity by which we get a feel for things. It succeeds when it leads to the discovery of something there."

2. *Move-testing experiments*: A "deliberate action undertaken with an end in mind." The move is either affirmed or negated depending on whether it produces what is intended.

3. *Hypothesis testing experiment*: "If, for a given hypothesis, its predicted consequences fit what is observed, and the predictions derived from alternative hypotheses conflict with observation, then we can say that the first hypothesis has been *confirmed* and the others *disconfirmed*."

The higher performing farmers in this study readily use language associated with research methods. They speak of experiments, variables, implementing controls, trialing new practices, comparative trials involving mobs of stock or different pastures, measuring production (milk in the tank) in relation to changed practices, identifying contributing factors, analysing results etc. These farmers have both a personal and financial interest in discovering better practices.

Schön (1987, p.74) recognises this interest of practitioners in "transforming the situation from what it is, to something ... better," as serving the practitioners' interest in changed practice. He concludes that these personal (and in the present cases, also financial) factors are the main distinctions between researching in the *practice context* as opposed to a *research context;* while this in no way limits the rigor. He considers the 'practice context' places demands on the hypothesis testing that are not present in the context of research. The practitioner's primary interest is in changing the situation and because, in the case of the farmers studied, the result translates to production or lack of the same, with either a positive or a negative effect on their business, manipulating results is not an option except in a practice of self destruction.

In Schön's terms,

> he must be open to learning, by reflection on the situation's resistance, that his hypothesis is inadequate and in what way (while) ... he plays his game in relation to a moving target, changing the phenomena as he experiments (p.75).

and

> He produces knowledge that is objective in the sense that he can discover error – for example, that he has not produced the change he intended. But his knowledge is also personal; its validity is relative to his commitments to a particular appreciative system and overarching theory. His results will be compelling only for those who share his commitments (p.79).

This experimentation leads to constant change and enhanced performance. While the lower performing farmers have almost certainly experimented during their years of farming, they don't recognise this as part of their practice. They may have experienced 'cycles of failure' or 'risk aversion and passivity' (Schön 1987, p.274), a concept which Schön identified as a mechanism for *self-protectionism* conceptualised by minimalising risk-taking, avoiding exploring issues in depth and avoiding conflict.

A member of a discussion group was observed displaying self-protectionism when he was very reluctant to accept a view opposed to his traditional knowledge. He brought the issue up several times, displaying a lack of open-mindedness and inability to accept other possibilities. He took the exploratory discussion personally, rather than as general to the discussion. This group member appeared to be searching for support (or permission) to retain the 'status quo,' rather than to change practice.

Stolzenbach, (1994, p.155) in his study of Mali farmers, supports the view of farm management as a "continuous series of experiments by which ... agricultural performance improves." He considers that this experimenting is integrated into everyday activities as a "continuous and innovative element of the craft of farming ... This pattern of continuous observation and adjustment – farming performance - is central to experimenting" (p.156). He supports Schön's process of reflection-in practice while saying that "in farmers' experiments, reflection and action overlap. There is no neat distinction between theorizing or hypothesis formulation and testing; they are continuous in both time and space."

6.4.1 Experimentation-in-practice.

A range of experimentations was observed in data from discussion groups observed and farmers interviewed.

Move testing - A discussion group farmer in growing a particular species of grass observes that while the grass grows profusely, the stock don't like it, therefore he questions its palatability. The group concludes that the farmer has the choice of testing for other variables or to cease use of this particular species.

Exploratory – A sheep and beef discussion group member had noticed a failure of sown paddocks in the extremely wet conditions. By exploring the reason for failure and observing grass growing where the drill had been cleaned out (spilled seed), he concluded that seed drilled conventionally, was too deep for the extremely wet conditions. This led to new knowledge for practice, as other group members were able to support these observations, from their own experiences or those of neighbours.

Hypothesis testing – Joe (HP) was investigating a lack of weight gain in cattle. He had a theory and was testing for several possibilities. He described the process as "being like a detective."

In contrast, Max (LP) referred to resowing paddocks on advice from a farm advisor (the only time he ever used one).

> (A casual worker) helped me resow quite a few paddocks with some new grass but it was a total failure. And we had no grass –so we were worse off. (The worker) and I talked about it (and stopped the resowing programme). (Max)

Max considered the new practice a failure, concluded that the consultant was wrong and consequently has never used an advisor again. While there are many possibilities why the resowing was unsuccessful, e.g. soil preparation, drought conditions, pasture management, grazing regime etc., Max was unable to pursue any possibilities. At the time, he was without the help and advice of his mentor and

relied on an unexperienced casual worker to help him analyse the problem. In effect, the process of *enquiry* was never conducted.

Schön (1987, p.64) recognises a shift to "accepting implications ... (and moving) from a stance of tentative exploration to one of commitment." This commitment begins with "back talk" from the experimental situation, which generates a system of implications for further moves. Max (LP) never had a full open *reflective conversation* with the situation and his *repertoire* of what he had known in his practice caused him to revert to the safety of past experience. He considered his past to be reliable, even though his lack of productivity had been the initial reason for seeking advice from the farm consultant. He minimised risk-taking and reverted to self-protection. This supports Schön (1987, p.274) in recognising *protectionism,* where the learner "avoids risk-taking (and) exploration of issues in depth, ..." thus limiting learning.

Henry (LP) in his recall of discussion group experience also expressed protectionism when he took critical analysis of his practice as personal criticism, while Colin and Ben (HPs) were at the other end of the spectrum. They found the frustration of lack of critical analysis a cause for their abstraction from their dairy discussion groups.

The higher performing farmers have an essential ability to conduct risk-taking experiments in order to learn and to progress. Often by creating or expanding new ideas or practices and through dissemination of their results, they act as *change agents* for other farmers to follow.

6.5 Communities of Practice

Lave & Wenger (1991) coined the term community of practice in their theory of situated learning. Wenger (1998) describes *communities of practice,* as a theory of learning that starts with the assumption that engagement in social practice is the fundamental process by which we learn and so become who we are. The primary unit of analysis is neither the individual nor social institutions but rather the informal 'communities of practice' that people form as they pursue shared participation and

interaction, over time. It intersects issues of practice, community, social practice, meaning and identity, in a conceptual framework for thinking about learning, as a process of social participation.

Joe and Colin (HPs) have both practised to mastery without any didactic structure, supporting Lave (1991, p.64) in developing new identities and recognising their own abilities to perform to a high level. Lave refers to this as "a new identity of mastery in practice." Both pathways were sociocultural in nature with social reformation of the individuals within their social practice and culture. Their communities of practice are not typical of non-farming workplaces and their legitimate peripheral participation was not as obvious as for those in workplaces that are more conventional. They were peripheral to other neighbouring farmers, observing farmers who to them were expert; while interacting with their environments and their associated histories.

6.5.1 Stolen Knowledge

Brown and Duguid (1992) talk of '*legitimised theft*' and '*stolen knowledge*' within situated learning, where knowledge is stolen through listening and observing, enabling understanding of a social practice. They issue a challenge to:

> redesign the learning environment so that newcomers can legitimately and peripherally participate in authentic social practice in rich and productive ways to, in short, make it possible for learners to 'steal' the knowledge they need.

The masters in this current study recognise this concept as invaluable in their learning.

> I learned ... from looking over the fence – from watching other people. (One skill) that I believe that I am very good at is, 'learn to be a thief' – pinch other people's ideas. Whenever you see something; pinch it. I've never come up with anything but I've put plenty of others' ideas into practice. (Colin)

However, Joe (HP) recognised that stolen knowledge can lead to poor practice also.

> (In early times) I worked with neighbours a bit – we were always independent of each other but we helped each other out occasionally... But there were certainly some skills I picked up from working with neighbours – and some bad habits too, I suppose.

All the cases studied talked of looking over the fence and observing other practices. They watch other farmers' practices as they drive around the countryside, observing successes and failures of both known and unknown 'colleagues.'

Joe recognised that farmers that he considered experts, changed over time. Some of those originally seen by him as leading farmers, never kept pace with changing times and ceased to be considered leaders in practice. Wenger (1998) refers to this concept as a misalignment of experience with competence. In order to achieve competence, newcomers transform their experience to fit the regime, with old-timers also requiring new experiences to keep up as practice evolves. This he refers to as *knowing in practice*. Through this process of change in social relations, both communities of practice and participants are transformed, with the once newcomer, becoming the leader in a changed community. Thus, expertise is not a permanent state but requires a need for mastery to be progressive and transformative; keeping pace with new technology and innovating new practices.

6.5.2 Identity

Identity is central to learning through social practice. It is a sense of belonging, a sense of membership, a sense of full participation; that which Lave & Wenger (1991) call *becoming a kind of person*. Meaning is derived within a system of relations that are developed within a specific social community, a specific culture of practice. Learning develops an evolving membership and an evolving identity in which "identity, knowing and social membership entail one another" (p.53). Cain (n.d.), cited Lave and Wenger (1991, p.81) defines identity as "the way a person understands and views himself, and is viewed by others, a perception of self which is fairly constant."

All subjects in this present study identify themselves as *farmers* but individual extensions of this identity range from "growing and harvesting grass" for the best return (Joe), to "harvesting the sun" (Ben). George talked of growing grass and marketing a traceable product to global customers, while Colin spoke competitively, of turning grass into milk for monetary reward. In many ways, these different aspects of identity form part of the subjects' motivation for farming. The four higher performers see farming as a business firstly but with a lifestyle attached, while in contrast Max and Henry (LPs), although commercial farmers, identify almost solely with the lifestyle of farming.

These differing identities lead to different behaviours, as former identities no longer 'fit' with their new membership in communities of practice. They begin to identify with groups of, for example:

- Winners or losers
- Innovators or adopters
- Leaders or followers

This in turn, separates them from membership in previous groups as their identity evolves, leading to some isolation and possibly some discomfort, from the loss of security of previous communities. Both Colin and Ben (HPs) described this isolation when they realised that they no longer had legitimate and full membership in their dairy discussion groups. For members of a group to maintain membership they need to identify with the critical points for that community.

Lave (1991, p.65) sees

> developing an identity as a member of a community and becoming knowledgeably skilful as part of the same process, with the former motivating, shaping and giving meaning to the latter, which it subsumes.

Max and Henry experienced prolonged delay from *peripheral* to *full* participation, which Lave sees as separating identity from knowledgeable practice.

> This view implies that learning and failure to learn, are aspects of the same social-historical processes, and points to relationships between knowledgeability and identity.

6.5.3 Dimensions of identity and competence

Wenger (1998) identifies dimensions of competence which become dimensions of identity (p.152):

1. *Mutuality of engagement,* in which participants develop certain expectations "about how to interact, how people treat each other and how to work together".

2. *Accountability to an enterprise,* in which identifying with a role gives one certain focus. It moves the participant to understand certain conditions and to consider certain possibilities, making choices in certain actions and values.

3. *Negotiability of a repertoire,* in which a history of practice is recognised in the "artefacts, actions and language of a community". Individual personal histories of participation create an identity based on personal experiences. This allows individual relations of negotiability with respect to the individual's repertoire of practice.

The inverse of the process described, results in lack of confidence, non-membership and lack of identity. Several of the cases in this study experienced this lack of identity at school. This resulted in a lack of confidence in their personal ability for academic pursuits, requiring them to construct knowledge through communities other than academia.

Wenger (1998) suggests further, that identity is defined by convergent and divergent trajectories or pathways of continuous motion. With people entering or leaving various communities of practice, new knowledge, expectations and values develop.

Describing what he calls 'insider trajectories' Wenger says:

> The formation of an identity does not end with full membership. The evolution of practice continues – new events, new demands, new interventions and new generations, all create occasions for renegotiating one's identity (p.154).

This renegotiation in practice requires a degree of discomfort as one leaves the security of a known identity, to embrace another foreign identity. The inability to complete this process was shown by Henry when he adopted a new practice partially, without the ability to complete the 'change in thinking' required to fully embrace the new practice. He sought to maintain his security and identity, avoiding the challenging paradigmatic change. This ability to change with evolution of identity is an intrinsic dimension of innovation, evident to varying degrees in the higher performing cases in this current study. Any major change in farming practices requires risk-taking, informed decision-making and open-mindedness with the willingness to move outside the known comfort zone of the practitioner (Table 6.1).

6.5.4 Constellations of communities of practice

To describe a broad or diverse set of communities contributing to a specific practice, Wenger (1998, p.127) refers to such configurations *as constellations* of interconnected practices. In a constellation of communities of practice, each community contributes in its individual way to the "constitution of the overall constellation." He coined the term 'constellation' in reference to a group of communities that contribute to a specific practice, although they may not be "particularly close to one another, of the same kind or of the same size." Inclusion in a constellation is a way of recognising a specific relationship, which contributes to a practice and a culture that the communities have in common.

These include:

1. Sharing historical roots
2. Having related enterprises
3. Serving a cause or belonging to an institution
4. Facing similar conditions
5. Having members in common
6. Sharing artefacts
7. Having geographical relations of proximity or interaction
8. Having overlapping styles or discourses
9. Competing for the same resources. (Wenger, 1998, p.127)

Constellations of communities of practice, for the farmers in this study, include farm discussion groups, neighbours, farming publications, advisors, scientists (if knowledge and experience is shared), specialist field-days, monitor farm groups, mentors and others. This process differs from mere socialising, involving participation for practice. These relationships are interconnected by a sense of belonging, identifying with the particular extended practice and the culture of that practice.

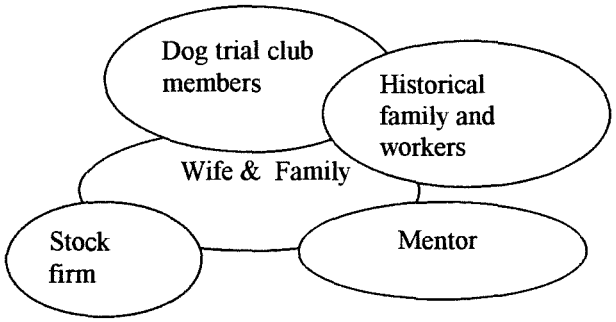
Changing rural communities (Allan, 2000) and the resultant lack of social infrastructure, enforce the need for strong constellations of communities of practice to extend, challenge and assist in the construction of rich experience and rich knowledge. Those who neglect this area of their enterprise could be called *resource-poor,* (Scoones & Thompson, 1994). They lack extension of their dispositional knowledge and subsequently the ability to make knowledge useful in practice.

In this current study, the farmers' constellations of communities of practice were mapped, with the lower performers (Max and Henry) displaying resource-poor constellations (Figure 6.1) while the higher performers maintained resource-rich constellations (Figure 6.2). The richness of a practitioner's constellation of communities of practice, is identified as a major indicator of transformative learning, identification with knowledgeability, and of success.

Figure 6.1

Constellations of Communities of Practice: Resource - poor.

An example of a resource-poor constellation of communities of practice.
- Max's sociocultural resource base



6.5.5 Boundaries and brokering between communities of practice

Colin (a dairy farmer) referred to high country sheep farmers as "a different breed." In an earlier study, (Allan, 2000) a sheep farmer referred to dairy farmers in a similar manner. These examples indicate that the different groups of farmers don't identify with each other in what has been referred to as their *different subcultures* (Allan, 2000). While these farmers may learn from each other by observing practices 'over the fence' or when driving along the road or even through common grazing and other contractual arrangements, they cannot be considered part of their specific constellation, if they do not *identify* with each other.

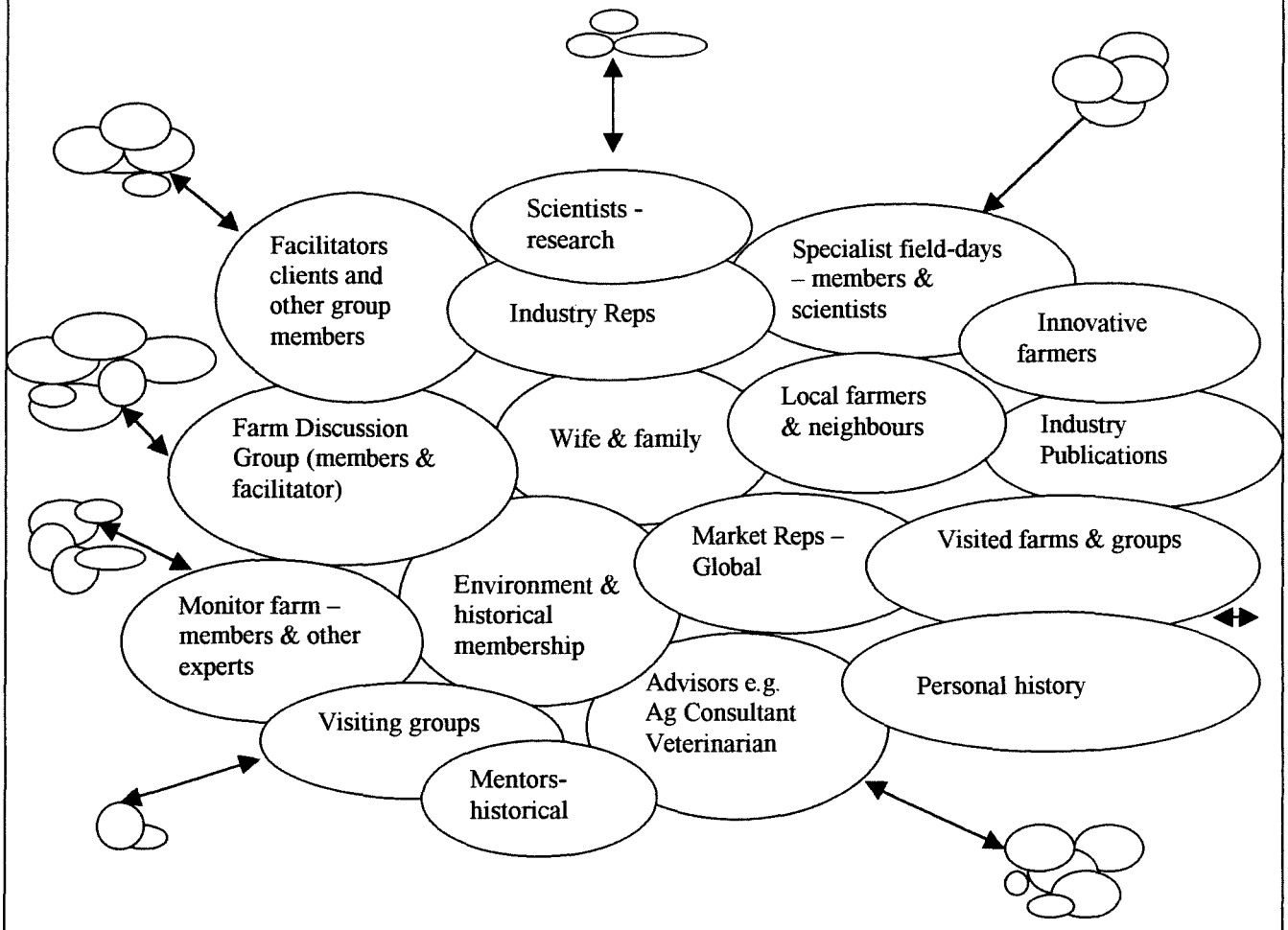
Thus, while there are *boundaries* circumscribing these two subcultures, the two sectors commonly practice boundary riding, watching (often unobtrusively) what the other sector is practising, and adopting relevant ideas for innovation. The higher performing sheep and beef farmers (Joe and George) both spoke of using farm

consultants who also have a large dairy clientele. They saw this as an advantage, enabling the ability to learn through client experiences from both industries. These consultants act as *brokers* making "new connections across communities of practice, enabling coordination, and – if they are good brokers – opening new possibilities for meaning" (Wenger, 1998, p.109). This is an invaluable role that farm consultants can adopt - both for individual practices and for farm discussion groups; as multiple practices. *Boundary encounters,* (Wenger, 1998) in the form of farm (practice) visits, conversations and the reading of other sector publications, were referred to by both of the higher performing sheep and beef farmers (George and Joe). The success of these encounters as learning sources is dependent on openness by practitioners to embrace new knowledge and a generosity of spirit within both cultures of practice.

Figure 6.2

Constellations of Communities of Practice: Resource - rich

An example of a resource-rich constellation of communities of practice as experienced by higher performing farmers - Joe's sociocultural resource base.
Individual communities are also richer with higher-order knowledge bases.



↔ Communities of practice extend to influences from associate constellations – a two-way relationship.

- Some relationships may be stronger than others
- Peripheral access may be through brokers or boundary encounters.

6.6 'Formal' v 'informal' education

There are conflicting views in current literature regarding the relationship between formal education and farmer performance (Chapter 2). Discussion on this issue is further dependent on whether 'informal' learning is considered *valid education* (Bamberry et al., 1997). While only two of the six cases in this present study, have 'formal' qualifications, data analysis reveals two masters in Joe and Colin who are both highly educated albeit 'informally.' This study has explored the process of learning, which in the four higher performing farmers, has revealed a formalised structure. These practitioners are proactive learners seeking knowledge from a wide range of sources and constructing knowledge through contextual, sociocultural interaction.

Billett (2001, p.15) challenges the labelling of education as either *formal* or *informal.* He sees such labelling as "fostering a view that learning experiences in the workplace are incoherent, (and) lack structure ... " He considers that the use of negative labels for workplace learning, such as 'non-formal' and 'informal' persist, due to *teaching* and *learning* being seen as synonymous.

> ... the absence of qualified teachers and a deliberately structured curriculum can easily lead to assumptions that learning in workplaces (is) inferior to that occurring in schools, colleges and universities.

The cases discussed have a depth of knowledge that sustains their evolving practice. All, including those with university qualifications, have constructed this knowledge, skill and accompanying abilities, through a range of experiences which Joe calls "the university of life." They do however see a 'formal' education as important for young people contemplating farming as a career. All the higher performing farmers would complete tertiary qualifications if they were starting today.

> I think that to be qualified, to say that you have got some qualification that you can hang on the wall – I'd get a lot of pleasure out of that. But a person who has it, - whether they have the ability to use it correctly is more important. ... The thinking and the big picture view of things and how you handle the ups and downs – and doing the right thing and (asking yourself) are there different ways of doing it? (Joe)

> I'd advise (young people interested in farming) ... to go to university...but not necessarily to do anything in farming. It could be something entirely different but I think that skills (thinking and learning) that they would learn there would be a huge benefit to them and to

> their farming career later on ... So I'd say, don't do something in farming, go and get some education in something else. (Joe)

Ben (who has an honours degree) confirmed this view that dispositional knowledge is a major product of tertiary education experience.

> Qualifications are as important for farmers as for anyone else. Any degree or other education is useful in that it helps you to think – to think about things differently - not necessarily agricultural qualifications. (Ben)

Overseas travel was also rated as important for dispositional development, while getting a better understanding of the world and global markets. (George, Ben, Joe).

Colin, while supporting university qualifications, expressed disillusionment with agricultural industry training (ITO) which, as a trainer he was no longer prepared to support.

> I tend to think that a lot of them (apprentices / trainees) are the wrong people to go farming. The ITO in its drive for numbers will take people ... just for a number. The schools, whether we like it or not, (put) agriculture at the bottom of the list in careers. The 'dumb ones' are still encouraged (to leave school early) to go dairying. (Colin)

He was critical of the curriculum for the ITO diploma programme also.

> I think if I'm honest, some of it is absolute bullshit (and) some of it is so basic ... The practical on-farm stuff that they go through is just – the way they try to teach it is just rubbish. (Colin)

Ben, in contrast, thought the diploma course was useful for the right person but was guarded in regard to the certificate (apprenticeship) course. He thought it was a good idea but was unconvinced about its effectiveness. They both thought that banks preferred to lend money to those (young farmers) with qualifications, which was the reason many enrolled in the courses.

These views support the practice where *exchange-value* replaces the *use-value* of participation. Lave and Wenger (1991, p.112) call this process "commoditization of learning ... which manifests itself in conflicts between learning to know and learning to display knowledge for evaluation." Prawat (1989) referred to this concept as developing a disposition for *performance* as opposed to a disposition for *mastery* while Lave and Wenger (1991, p.14) refer to *commodity* as a major contradiction "underlying the historical development of learning." From these perspectives, commoditization of learning limits construction of useful knowledge for practice.

Colin's views indicate also a possible commoditization of labour, a common perception of staffing problems in the dairy industry. Lave and Wenger (1991, p.76) describe this as transforming "apprentices into a cheap source of unskilled labour, put to work in ways that deny them access to activities in the arenas of mature practice." This lack of legitimacy results in inhibited learning. The 'numbers game' described, with the direction of unmotivated young people into farming workplaces, does not encourage legitimate access to mature practice. Whether a possible commoditization of labour is leading commoditization of education and training or the reverse, is a question for further research.

While the farmers studied, value tertiary qualifications, it is for their total value of learning – learning to think and thinking to learn - rather than particularly for the value of the curriculum content.

Table 6.1

Categorising dispositions for rigorous thinking and rigorous practice - towards mastery.

Perkins, Jay & Tishman (1993), promote seven dispositions for *good thinking*. Due to the similarity of the categories identified in this current study, these seven concepts were used to categorise the dispositional knowledge identified from interviews and observation of the higher performing farmers.

Dispositional ability:

1. ***To be broad and adventurous:***
- Open-minded
- Risk-taking
- Innovative
- Proactive
- Peripheral vision (big picture)
- Decision-making
- Out of comfort zone
- Passion – Love of farming

2. ***Toward sustained intellectual curiosity:***
- Questioning
- Probing
- Possibilities (not problems)
- Critical analysis
- Have a dream
- Observational
- Challenge beliefs

3. ***To clarify and seek understanding:***
- Expects success
- Positive with failure
- Sees mistakes as inevitable (knowledge generation)
- Experimenter
- Reflective practitioner

4. ***To be planful and strategic:***
- Systematic and strategic
- A kind of anticipation
- Out of square thinking
- Resourceful
- Practical – gets it done and well
- Active continual learner
- Resilient
- Adaptability
- Social learner

5. ***To be intellectually careful:***
- Reads avidly
- Seeks out successful practitioners
- Seeks other opinions
- Researcher in own right
- Critically analytic

6. ***To seek and evaluate reasons:***
- Questions own beliefs
- Questions historical and local knowledge
- Experiments in practice
- Recognises gaps in knowledge – seeks other experts
- Self-directed learner
- Self-driven

7. ***To be metacognitive:***
- Self aware
- Self challenging
- Rigorous thinker
- Continual reflection (thinking on thinking)
- Holds conversations with self
- Enjoys debate, mental challenges

Rigorous thinking and subsequent actions lead to:

- **Resilience and resourcefulness required to progress in expertise.**
- **Evolution of identity to mastery**
- **Maintenance of mastery**
- **Reproducing and transforming communities of practice**

The higher performing farmers exhibit these dispositions to a higher-order level. Most are not strongly evident in lower performers.

6.7 Dispositional knowledge

As described in Chapter 2, there are many different definitions and accompanying theories of dispositions and their relevance to knowledge construction. In searching to identify dispositional ability, within this current study, the emergent theory is a synthesis of these theories.

Emergent data supports Katz (1993, p.1) in defining dispositions as conscious, voluntary and directed habits of the mind. They are "intentional and mindfully directed toward particular objects and situations." While supporting this view, the present study recognises that dispositions are embedded in personal and sociocultural values, (Billett, 2001) and in evolving personal identity (Wenger, 1998).

Perkins et al (1993) describe their dispositional theory of thinking as 'beyond abilities.' They advance seven dispositions as characteristics of good thinking into which the dispositions identified in this study were incorporated.

In analysing the dispositional characteristics of the higher performers in this current study, it emerged that they are not only characteristics of rigorous thinking but also of rigorous practice. Therefore, they are advanced as dispositions for both thinking and practice, which are intrinsic to construction of an identity for mastery (Table 6.1).

This analysis supports the writer's use of the term *dispositional knowledge* rather than the term *dispositions* as most other writers favour. It is proposed that *dispositional knowledge* is as legitimate a term then, as propositional knowledge and procedural knowledge. As discussed previously, the interdependence of these three knowledge forms mean that:

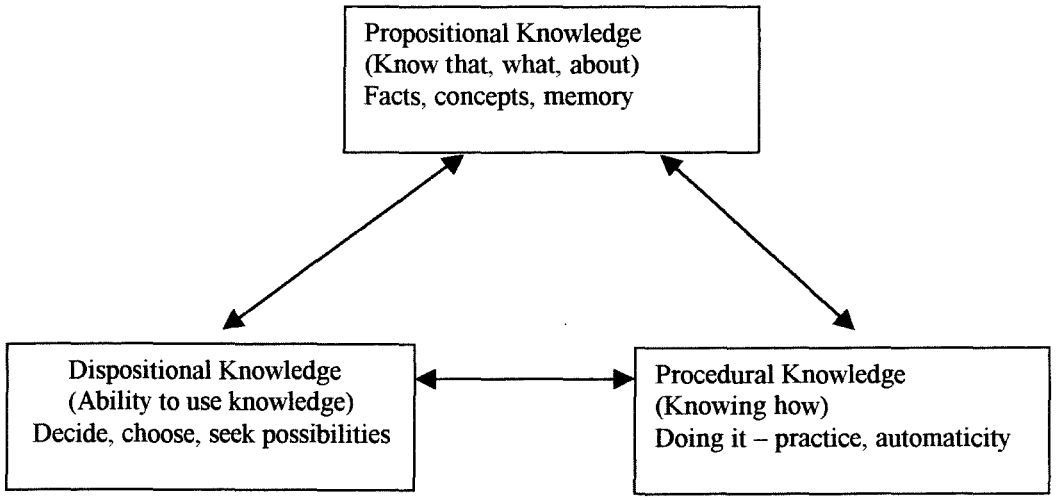
> ... everyday thinking, acting and learning will interdependently engage and develop further all three of these forms of knowledge (Billett, 2001, p.55)

The interdependency of knowledge forms is depicted in Figure 6.3. They each have mergent roles for knowing in practice, a process identified in Chapter 5. While a

person may construct a wealth of propositional knowledge, without the dispositional ability to proceduralise the array of knowledge to a useable form and to automaticity, they may still be considered resource-poor and subsequently perform at a lower level.

Figure 6.3

Knowing in Practice:
An interdependent set of relationships



(Based on Billett 2001; Ryle 1949; Prawat 1989; Anderson 1982)

6.8 Generalizability

Although the design of this research does not lend to statistical generalisations, the use of purposive sampling, theoretical sampling and the comparative approach allow analytic and theoretical generalization. Silverman (2001, p.250) cites Perãkylä who put the case that,

> The comparative approach directly tackles the question of generalizability by demonstrating the similarities and differences across a number of settings.

Silverman agrees, "the comparative method ... allows you to make larger claims about your analysis ..." Yin (1994, p.3) supports this view of analytic generalization saying that "if two or more cases are shown to support the same theory, replication may be claimed."

This present comparative research makes tentative analytic and theoretical generalizations while making no statistical generalizations.

6.9 Situated learning: Context-specific, guided learning within sociocultural communities of practice – (emerging theory).

The pathways of the six farmer case studies are summarised in conjunction with Figure 6.4. All six cases had early sociohistorical attachment and engagement in a farming community of practice; either on their family farm or on a farm of a relative or acquaintance. For some (Joe and Ben – both higher performers), this engagement was more fleeting and tenuous than for others but in all cases a strong attachment was formed, resulting in a sustaining love of farming and a dream of one day having the 'privilege' of owning a farm.

This study has identified a need for at least a temporary disengagement from farming to another context, for dispositional knowledge to develop from a broadened set of social practices. These practices may include other workplaces, tertiary education, travel, or a combination of experiences. This affords a *decision* to be made as an adult, to *choose* a career pathway, rather than simply fulfil social expectations.

The success of the relationship of social co-participation between novice and master, (no matter what is the age of the novice) relies on:

- Commitment
- Legitimate sociocultural access
- Transparency

This relationship is reciprocal and requires a generosity of spirit.

Those cases (Henry and Max - LPs) who either never experienced such a committed relationship, or who never disengaged to another context, became alienated from their community of practice and disengaged psychologically. This psychological disengagement limited:

- Learning
- Evolution of identity
- Construction of dispositions

As a result, they were disempowered, limiting motivation and the ability to construct an identity for mastery. These farmers remain lower performers.

There is an indication from this study that there may be a critical period for construction of dispositions for knowledge-use and for mastery. If the critical period is not fulfilled it may damage or limit development. Further research is needed to identify this critical period but anecdotal evidence was spoken of by Joe.

> (Old-timers) used to say that if a young farmer hasn't taken over the reins by 30 (years of age), then its too late. He won't succeed. (Joe)

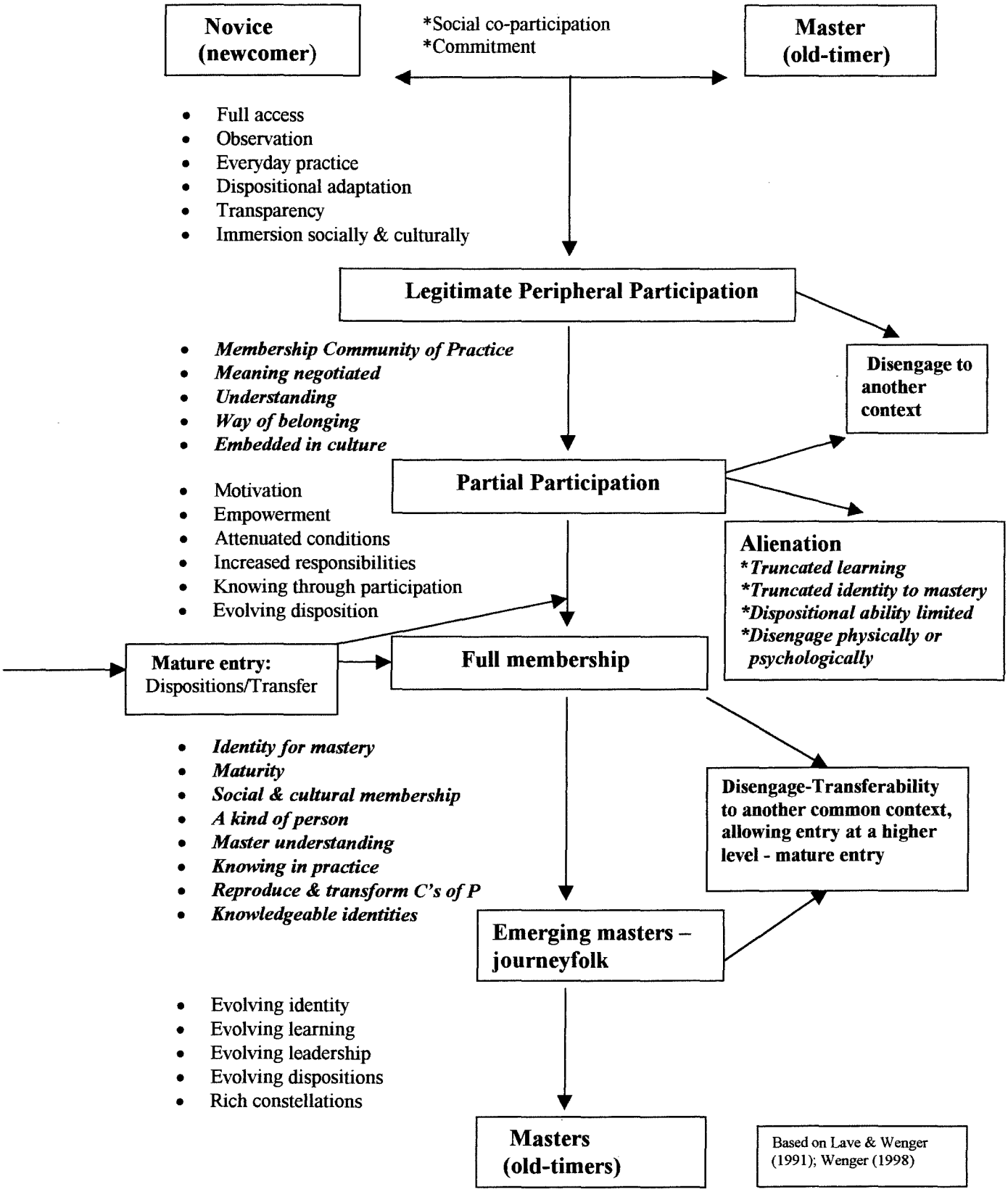
This indicates that historically, a critical period was identified.

Those farmers who disengaged physically (and often also psychologically) from the direct pathway, voluntarily and with a purpose in mind, were able to re-enter at a mature level with success. The levels of re-entry varied from partial to full participation. Those who were relative novices were able to accelerate learning with some evidence of transfer of associated knowledge, skills and dispositions.

With maturity and the propositional, procedural and dispositional knowledge constructed through their experiences, they learned through participating in a community of practice; within a culture of practice. Their experiences and maturity enabled ready sociocultural assimilation into the specific rural culture.

Figure 6.4.

Situated learning: context-specific, guided learning within sociocultural communities of practice - (emerging theory).



As emerging masters, both Joe and Colin were tested by climatic and financial adversity. Coping with such challenges was important in their evolving identity, learning and disposition. Over time they developed rich constellations of communities of practices (Figure 6.2) enriching their knowledge base and enriching their practice.

George and Ben, as emerging masters are at the stage in their careers where they are being tested in their business choices and decisions. Full emergence to mastery depends on how they cope with both adversity and success.

A fully committed and reciprocal novice to mastery relationship negotiated with full access to the social and cultural practice, is essential for successful guided learning or apprenticeship, in everyday practice. There is an essential relationship between culture and cognition in contextual learning; everyday cognition (Rogoff, 1984).

Mature entry to farming after developing dispositionally through tertiary education, travel and other experiences, according to both the opinions and experiences of the cases studied, is more likely to succeed to mastery.

6.10 Further research

Areas identified for further research include:

- The need to study young novices and also those at mature entry level, to gain insight and knowledge into their learning processes and differing needs.

- To compare the effectiveness of discussion groups within a wide range of farming types, seeking to identify critical points for effective group learning.

- To study the essential value of farming women within farming enterprises and communities of practice while seeking to identify how (or whether)

women maintain or expand their personal knowledge construction, use and sense of fulfilment.

- To study farming enterprises as communities of practice within constellations of communities of practice, to explore the relationships and interdependencies and how they contribute to knowledge construction.

- To study communities of practice in order to seek relationships between barriers to learning, perceived commoditization of labour and possible commoditization of education and training.

Many of these are areas touched on by this study but unable to be considered in depth due to the limitations of this present research. They are areas that interested the farmers involved in this study and in some instances, were suggested by them.

6.11 Conclusion

This chapter has discussed major findings in relation to theory. Emerging theory has been explored and discussed in relation to how farmers learn in and for practice. Ideas for future research have been presented. Chapter 7 summarises findings and key ideas. Possible implications for farming as a learning culture are identified.

Chapter 7
Conclusion

7.1 Introduction

The purpose of this chapter is to sum up the research findings and present key arguments regarding how the farmers studied learn, in and for practice. Emergent theory is summarised and possible implications for farming as a learning culture are outlined. Major findings are elucidated with many historical assumptions challenged.

This chapter provides insight into the phenomenon of farmer learning, presenting areas for discussion for farmers and other professional sectors involved in agricultural consultancy, extension services and education and training. It offers insight into the lives, experiences and competencies of six New Zealand farmers, challenging assumptions regarding how farmers learn, while promoting a formality and authenticity of farmer knowledge.

The structure of the chapter has the following nine subsections:

7.2 Situated learning and dispositions

A common phrase used in agricultural education and training is that farmers learn 'on the job.' Situated learning though, is not just being on the job (situated activity) but is a process involving commitment, transparency and generosity, in providing legitimate access to the sociocultural community of practice. People do not learn by a form of osmosis, from simply being there but actively construct knowledge through engagement and social interaction.

Those cases in this study who grew up on farms, developed socioculturally to *legitimate peripheral participation* level (Figure 6.4) and at times to become *partial participants*. Those who remained continuously involved on their family farms struggled to move to *full membership*. There is a common experience in those cases where the father as employer, limited access to *full participation* (probably unconsciously), by exercising control over the participatory level of the son's involvement. There was a lack of transparency, a lack of empowerment and a lack of attenuating conditions. This appears to have led to a loss of learner motivation due to truncated learning. Lack of identity towards mastery and limited dispositional ability for progressive knowledge, limited the learner's ability to *construct* and *use* new knowledge.

The result for these two farmers as young men, was to disengage psychologically while remaining on the family farm. It is unclear what their role was in the farming enterprise but it appears to have resembled "an extra pair of hands." It lacked progressive responsibility and management decision-making. As a result, these two farmers have struggled to farm throughout their careers, both being lower performers and (although commercial farmers) mainly farming for "the lifestyle."

7.3 Constructing knowledgeable identities

Those farmers who never grew up on farms, along with those who left their family farms either to work at other workplaces or to pursue tertiary education and travel, developed into rounded people. They experienced increased responsibilities, evolving disposition and a *'kind of knowing'* (Schön, 1983) through practice. These largely dispositional abilities, enabled their mature entry or re-entry to farming at, or approaching, full membership level (Figure 6.4). They demonstrated some transfer of knowledge and an ability to rapidly construct the knowledge required. Through their off-farm experiences, they had learned how to learn, and developed the dispositions required to construct and use knowledge; they had developed *knowledgeable identities*.

This knowledgeable identity, combined with a wide range of dispositions (Figure 5.2 and Table 6.1) and maturity, allowed for a rapid pathway to sociocultural membership and an identity for mastery. They became 'a kind of person' (Lave & Wenger, 1991) with ability for understanding, which led to emerging mastery.

7.4 Dispositions, thinking and practice for mastery

The two masters in this study (Joe & Colin) have experienced the highs and lows of practice, requiring the full range of higher-order propositional, procedural and dispositional knowledge. They display the full range of dispositions identified for rigorous thinking and rigorous practice in higher performing practitioners (Table 6.1). Throughout adversity they have had to be resilient and resourceful, often making challenging decisions and taking substantial but calculated risks.

Through a formal process requiring open-mindedness, critical analysis and a need to challenge their beliefs, they have kept ahead of the fast pace of changing technology and subsequent new practices. They have maintained and extended their mastery through continually evolving dispositions, identity, learning and leadership.

7.5 Resource-rich constellations of communities of practice

While George and Ben (emerging masters), have yet to prove themselves as masters, they are on the journey and have the ability to progress to that advanced level. Both the masters and emerging masters in this study have developed resource-rich constellations of communities of practice, (Figure 6.2) which they are continually extending through practice and social interaction. In parallel, they are continually evolving through practice their higher-order propositional, procedural and dispositional knowledge.

The lower performers in contrast, exercise lower-order knowledge and resource-poor constellations of communities of practice. They rely strongly on historical and local knowledge learned from their fathers and others who influenced them in their early years. In critical incidents, they referred regularly to currently following practices learned at a time when farming was a protected industry, vastly different from present day practice. They have not kept pace with agricultural technology and have not made the transition to modern farming practice. These practitioners have not made the change in attitude required to farm successfully, in today's political and economic climate.

Due to their extensive and advanced dispositional abilities, the higher performing farmers, (masters and emerging masters) have the ability to move with fluidity in constructing higher-order knowledge either from a propositional base or from a procedural base. In contrast, the lower performers favour lower-order procedural knowledge; the more routine tasks. This preference appears to be due to their lack of dispositional ability.

7.6 How do farmers learn/construct knowledge, in and for practice?

According to this study, it could be concluded that these farmers learn through participation in the practice of farming. This practice includes a constellation of communities of practice, which may be weak or strong depending on the range and depth of the farmer's involvement. Through full and committed participation in these practice communities and associate constellations, the practitioner's identity evolves, (Wenger, 1998) encouraging new practices, ideas and innovation.

While expertise depends on a convergence between experience and competence, innovative learning requires their divergence (Wenger, 2000). The lower performing farmers lack the dispositional ability to move outside their comfort zone and to take the associated risks for innovation, while the higher performing farmers in contrast enjoy this challenge If the practitioner hasn't the disposition to move outside their comfort zone, over time their expertise becomes obsolete as it is not maintained or revitalised.

If apprenticeship (either 'formal' or 'informal') is not committed, transparent and empowering for both novice and master (no matter what age), learning is inhibited and identity development becomes confused, limited or negative. There is a strong message here for all farmers as employers, as well as for their farm employees. Within a learning culture, commoditization of both labour and education and training is an issue to be considered and challenged.

This study concludes that farmers learn through an evolving process of belonging legitimately to a community of practice and associated constellations within a culture of practice, where identity evolves, as the practitioner becomes 'a kind of person' and as meaning is negotiated through experience. Expertise is not a permanent state, requiring evolving identity, knowledge and disposition, for maintenance and growth within a culture of practice.

7.7 Emergent Theory

Effective and productive situated learning, integrates a complex set of relationships amongst community, practice, identity and meaning (Wenger, 1998). Through these relationships, a sense of *belonging* and *becoming* evolves through sociocultural experience, enabling knowledge construction and use of knowledge. Knowledge (propositional, procedural and dispositional) is constructed socioculturally through engaging in a community of practice while immersed, with legitimacy, in a culture of practice.

From inductive research of the personal histories and practice of six farmers as case studies, the following theory emerged.

- That dispositional knowledge is socioculturally constructed through personal ontogenies and supported by legitimate participation in communities of practice.

- That dispositional ability (knowledge) underpins construction and use of propositional and procedural knowledge.

- That construction and use of higher-order propositional and procedural knowledge requires higher-order dispositional knowledge.

- That mastery is developed through evolving identity, dispositions, leadership and learning; socioculturally constructed through resource-rich constellations of communities of practice.

7.8 Conclusion

It is concluded that the learning of farmers in this current study is mirrored by the richness or poorness of their constellations of communities of practice. Their dispositional knowledge is strengthened or weakened by sociocultural interactions in communities of practice and these dispositional abilities in turn, are the basis for development of propositional and procedural knowledge, through quality constellations of communities of practice.

Those cases studied, emphasise that personal histories are crucial to how a person accepts challenges, takes risks, makes decisions and achieves other requisites of higher performance. It is identified from the masters within this current study, that a traumatic or disadvantaged personal history, as with Joe and Colin's school years, can be a motivation or drive for success. Adversity is identified as an important catalyst for learning.

Qualifications or lack of the same are no indication of knowledge, ability or performance in practice. Both those higher performers with and without qualifications have exercised a formal, focused pathway to constructing higher-order knowledge in practice. This knowledge has a strong interdependence (Billett, 2001) between propositions (conceptual knowledge), procedures (practical knowledge) and dispositional ability, to enable use of knowledge.

Higher performers have the ability to move with fluidity through cognitive processes of knowledge construction while dispositions, (which are developed socioculturally), have the overpowering influence on both knowledge construction and its use in practice. In contrast, lower performers exhibit a strong preference for learning from a practical base.

7.9 Implications for farming as a learning culture

This research has identified a range of possible implications for the agricultural sector. According to findings, it is important that all sectors of agriculture including farmers and their staff, advisors, trainers, extensionists and scientists recognise:

- the importance of dispositional knowledge as vital to underpinning all knowledge construction and use.

- the essential nature of empowering participants in communities of practice for learning.

- the value of resource-rich constellations of communities of practice.

- the need for balanced life experiences which contribute, through evolving dispositional knowledge, to useful knowledge.

- the fluidity of learning of those with a level of expertise emerging on mastery.

- the strength of experimenting as a means of researching-in-practice.

- the value of **effective** group learning, combined with practice, storytelling, enjoyment and science.

- the value of contextual and situated learning in and for practice, as a legitimate and 'formal' process.

- the importance for learning to be relevant to the needs of the individual, seeking to fill gaps in their knowledge profile rather than responding to a commoditized version of education and training; To seek quality, relevance and inspiration while developing the disposition to think and to practice.

- the process of gaining formal qualifications is arguably of value predominately for its contribution to the construction of dispositional knowledge, including an ability to think critically.

Kearns and Papadopoulos (2000) identified a two-cultures phenomenon within society, business and industry; learners v non-learners, learning-rich and learning-poor firms, with winners and losers. They saw this as likely to be crucial in the new economy, the 21st Century. This present research has explored the experiences and practice of six farmers, identifying learning-rich and learning-poor characteristics and the need to emphasise a learning paradigm for mastery in the 21st Century.

This research challenges assumptions that farming is not *knowledge work*. It argues that performance and knowledge exist in parallel as *knowing in practice*, which is reflected in the practitioner's level of performance. Higher performing farmers are currently riding the knowledge wave as they create value for themselves, for their industry and for the economy.

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Ikawai
7RD
Waimate

Dear

As part of my Masters degree, I am conducting research into how farmers learn, who and what contribute to this process and how this impacts on farmers and their knowledge in the 21st Century – the much publicised 'knowledge era'.

As discussed with you by phone, the involvement required will consist initially of an interview (approximately 1hour to 1.5 hour long), during which I will make notes of your responses, my observations and our interactions during this time. If you are willing, it would be helpful if I could record the interview on tape. The tape will be destroyed on completion of my thesis obligations. After some analysis of the subsequent data, I may seek your confirmation of information. This will be changed as required and I will share the research findings with you on completion.

I anticipate a second interview either in person or by telephone, to complete the process. This would be at a time convenient to you.

People involved in my thesis will be protected by an assurance that names, places and other identifiable information will not be included in the written research. The protection of the privacy of individuals or groups observed, discussed or participating directly in this research will be paramount.

My research is being supervised by Maureen Doherty and Pim Borren of the Christchurch College of Education.

Any participant may withdraw at any stage of the project. If you have any complaints concerning the manner in which the project is conducted, you are encouraged to discuss it either with me or, if an independent person is preferred, with:

The Chair
Ethical Clearance Committee
Christchurch College of Education
P O Box 31-065
Christchurch
Phone: (03) 348 2059

If, considering the above information, you agree to be part of this research, please sign the consent below. A copy will be supplied for your records.

I may be contacted at any time on Ph. (03) 6892642 fax (03) 6892742 or email: the.farm@xtra.co.nz.

Thank You.

Yours sincerely,

Jan Allan

I ---------- consent to being a participant in the above research developed by Jan Allan.

I agree to my information being used as the researcher sees as appropriate within the acceptable guidelines discussed.

I understand that my identity will be protected at all times.

Signed: ---------- (Subject) Date: ----------

Signed: ---------- (Researcher) Date: ----------

Appendix 2

Question Schedule First Farmer Interviews (a guide)

1 What was your first involvement with farming?
*At what age? Born on a farm?
*Your wife / partner?

2 Tell me about your schooling – what was your experience?
*Confidence level in spelling, maths, reading, and handwriting– how has this impacted on your farming?
*Highest school attainment/level

3 What did you do when you left school?
*Post school qualifications
*Work history prior to farming
*Learning history including informal and non formal

4 How did you learn how to farm?
*Farm working history
*Working with others, observing, practice?
*Solving problems, experimenting

5 Tell me about an important learning event in your early days of farming?
*Talk me through how it happened and what happened.
*What was the most important thing you learned from this incident?
*Who or what helped you the most?

6 Why do you farm?
*What do you think are the most important skills, knowledge and attitudes that a farmer needs to know or have to be successful?
*Disposition? (These will be categorised and rated with common sources of information or learning in the second interview.)

7 How important do you think qualifications are for farmers?
*Agricultural?
*Non – agricultural?
(include non completed)
*Have you any formal qualifications since leaving school? (include part completed). Your wife /Partner? Other team members?

8 If you were advising a 15-year-old son/daughter/nephew etc who was interested in farming what would you advise him/her to do?
*Stay at school?
*Apprenticeship *life experiences
*Polytechnic *University

9 As a farmer, do you consider yourself a 'professional'? (farmer)

*Why? Why not?

10 How important do you think ethics are in farming?
*What values and attitudes are needed to farm successfully?
*Disposition

11 Rate yourself as a farmer within your type of farm eg sheep or dairy, irrigated or dry, size of farm etc. (Rate out of 10 with 10 being the highest)
*How do you think your consultant or advisor would rate you?
*Your accountant?

12 What is your wife's/partner's involvement on-farm?
*In farm management?
*In decision-making?
*Other family members?
*Other labour? (Permanent or casual)

13 What farmer groups do you belong to?
*How many times a year do you attend?
*Farm discussion group?
*Other groups?
*Farm monitor group?
*How valuable are they for increasing your knowledge about and for farming? (Rate individually out of 10 with 10 being the highest)

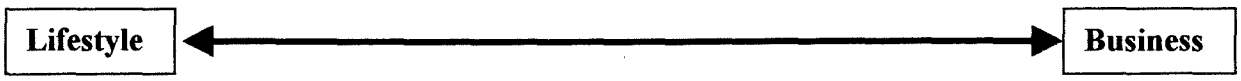
14 What is one change you have made due to farm discussion group influence?
*Tell me about it. How did it happen?

15 What other social situations do you find you learn from others about farming?
*How often do you attend field days, seminars etc (complete list)
*How useful are they?

16 To look at a few basic farming skills, how did you learn:
- Milking cows or lambing ewes?
- How to grow grass?
- Financial record keeping?
- Fencing?
- Employment of labour?

17 How important for you is:
*enjoyment in farming?
*profitability in farming?
*What would your answer have been 10years ago?
*Why the difference?

18 Where would you place yourself on the following line?
For you farming is a:



*Now?
*10Years ago?
*Why the difference?

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KNOWING IN PRACTICE: DISPOSITIONS, KNOWLEDGEABLE IDENTITIES AND PARTICIPATION.

Jan Allan
Christchurch College of Education, NZ.

Abstract
This paper reports a study that explores the question of how farmers learn, in constructing knowledge in and for practice. It seeks to identify how they gain new ideas, make changes, and develop to a level of expertise. Six central South Island (N.Z.) farmers were selected purposively as case studies. The range of case profiles provides for comparison and contrast of the relative importance of formal qualifications, differences between sheep/beef farmers and dairy farmers, levels of expertise, age and experiences. The self-rating of the farmers enables a comparison of lower and higher performers, identifying characteristics which enable insight into why some farmers consistently lead new practice and why some are reluctant followers. The farmers are identified as social learners although working independently, in relative geographical and social isolation; learning through participation in the practice of farming. This practice includes a constellation of communities of practice, which may be resource-rich or resource-poor. Emergent grounded theory suggests that dispositional knowledge underpins construction and use of all knowledge; that construction and use of high-order propositional and procedural knowledge requires higher-order dispositional knowledge and that mastery is developed through evolving identity, dispositions, leadership and learning, socioculturally constructed through resource-rich constellations of communities of practice.

Introduction
This paper is approached from the perspective of farmers as researchers in their own right, gaining knowledge. Schön (1983) recognised this 'kind of rigor' and 'experimentation' as knowledge-in-action and the action of a reflective practitioner. It proposes that as farming moves along the continuum from lifestyle, (i.e. valuing the 'way of life' as the dominant value of farming) to a paradigm where business and financial results are viewed as almost exclusive to intrinsic rewards, there needs to be a corresponding and increasing move from a trade-based skill culture to a professional-based learning culture. Farming in New Zealand has no strong tradition or cultural value of farming qualifications with farmers more commonly renowned for their ingenuity, inventiveness and stoic, hardworking attitudes. It is predicted that learning fast will be a major indicator of farm performance for the 21st Century (Parker, 2000). How are these six farmers making the transition from brawn to brain; from working hard to working smart?

Methodology
This current research is qualitative in design and approached from a constructivist and interpretive paradigm. Socially and experientially based, it seeks to understand the experiences of the subjects. The interviews aim to reconstruct the farmers individual processes of learning and their learning culture. Analytic and interpretive procedures (Strauss & Corbin, 1990) are employed to arrive at findings with emergent, grounded theory.

Case Study

To seek answers to the research questions, farmers were studied in their own worlds as case studies, with extended ethnographic interviews. Six farmers were selected purposively for a range in age, type of farming, level of formal education, innovation and farming performance, to allow contrast and comparison (Table 1.1).

Table 1.1 Case Profiles – Purposive sampling

Name (Pseudonym)	Farming Type	Age	Highest Formal Qualification	Self-rated performance	Innovator/ Adopter	School (level completed)
Ben	Dairy	36	BAgSci (Hons)	7/10 t	Early Adopter	7th Form
Colin	Dairy	49	None	8/10 t	Innovator	4th Form
George	Sheep/Beef	39	DipFMgmt DipAg	7/10 t	Early Adopter	6th Form
Henry	Sheep (ex Dairy)	50	None	4/10 *	Late Adopter	4th Form
Joe	Sheep/Beef	52	None	8/10 t	Innovator	3rd Form
Max	Sheep	55	None	3/10 *	Late Adopter	4th Form

* Lower performer t Higher performer

The case studies are both explanatory and exploratory, involving personal histories of learning; the subjects' ontogenies. This study seeks to illuminate decisions towards, and processes of, learning (Yin, 1994). It does not seek to represent a statistical sample but, "to expand and generalise theories, (analytic generalisation) and not to enumerate frequencies (statistical generalisation)," (p.10).

Case Interviews

Extended ethnographic interviews are chosen to study the *culture of learning* with the selected farmers. An attempt is made to enter each farmer's world, and to glean the richness of each unique set of circumstances that influence their individual knowledge construction. All farmer interviews were audio-taped and fully transcribed for coding, to provide accuracy for quotes and for robust analysis and accuracy of data. The transcriptions proved to be invaluable for coding and categorising data, for identifying emergent concepts and for enabling grounded theory to emerge with clarity. This research focuses on a small number of farmers as exploratory case studies while seeking also to produce descriptive data as the participants tell their own stories. *Critical incidents* are used in question design and analysis, (Billett, 2001; McCracken, 1988; Strauss & Corbin, 1998) to reconstruct work events, in order to identify learning processes and knowledge construction. While on the surface this research may appear to be merely a small study of six people, it is in effect a study of an extensive array of critical incidents within the ontogenies of these six men as practitioners.

Self-rating of practitioners

The farmers in this study rated themselves against other farmers on comparable types of farms. This could be described as a self-appraisal in which farmers reflected on how their benchmarks rated compared to other similar practitioners. This reflection was reinforced by revisiting the question three times in total. The cases firstly considered the rating personally, and then in regard to how they believe their accountant would rate them, followed by how their farm advisor would rate them. This process required them to reflect with purpose. These ratings (Table 1.1) were used to compare lower performers (those rated 40% or below) with higher performers (those who rated 70% or

above). From the researcher's knowledge of the farmers, they rated themselves erring on the side of 'hard marking,' particularly the higher performers.

Theoretical Framework

Communities of Practice

Lave & Wenger (1991) coined the term community of practice in their theory of situated learning. Wenger (1998) describes *communities of practice,* as a theory of learning that starts with the assumption that engagement in social practice is the fundamental process by which we learn. It entails mutual engagement, joint enterprise and shared repertoire e.g. stories and artefacts. Through practice, people negotiate meaning and evolve identities.

Identity

Identity is central to learning through social practice. It is a sense of belonging, a sense of membership, a sense of full participation; that which Lave & Wenger (1991) call *becoming a kind of person.* Meaning is derived within a system of relations that are developed within a specific social community; a specific culture of practice. Learning develops an evolving membership and an evolving identity in which "identity, knowing and social membership entail one another" (p.53). Cain (n.d.), cited Lave and Wenger (1991, p.81) defines identity as "the way a person understands and views himself, and is viewed by others, a perception of self which is fairly constant."

Constellations of communities of practice

To describe a broad or diverse set of communities contributing to a specific practice, Wenger (1998, p.127) refers to such configurations as *constellations* of interconnected practices. In a constellation of communities of practice, each community contributes in its individual way to the "constitution of the overall constellation." He coined the term 'constellation' in reference to a group of communities that contribute to a specific practice, although they may not be "particularly close to one another, of the same kind or of the same size." Inclusion in a constellation is a way of recognising a specific relationship, which contributes to a practice and a culture that the communities have in common. Constellations of communities of practice, for the farmers in this study, include farm discussion groups, neighbours, farming publications, advisors, scientists (if knowledge and experience is shared), specialist field-days, monitor farm groups, mentors and others. This process differs from mere socialising, involving participation for practice. These relationships are interconnected by a sense of belonging, identifying with the particular extended practice and the culture of that practice. Those who neglect this area of their enterprise could be called resource-poor. They lack extension of their dispositional knowledge and subsequently the ability to make knowledge useful in practice. In this current study, the farmers' constellations were mapped, with the lower performers displaying resource-poor constellations while the higher performers maintained resource-rich constellations. The richness of a practitioner's constellations of communities of practice is identified as a major indicator of transformative learning, identification with knowledgeability, and of success.

Boundaries and brokering between communities of practice

While there are *boundaries* circumscribing the two subcultures of dairy and sheep/beef farming, the two sectors commonly practice boundary riding, watching (often unobtrusively) what the other sector is practising, and adopting relevant ideas for

innovation. The higher performing sheep and beef farmers spoke of using farm consultants who also have a large dairy clientele. They saw this as an advantage, enabling the ability to learn through client experiences from both industries. These consultants act as *brokers* making "new connections across communities of practice, enabling coordination, and – if they are good brokers – opening new possibilities for meaning" (Wenger, 1998, p.109). This is an invaluable role that farm consultants can adopt - both for individual practices and for farm discussion groups; as multiple practices. *Boundary encounters*, (Wenger, 1998) in the form of farm (practice) visits, conversations and the reading of other sector publications, were referred to by the higher performing sheep and beef farmers. The success of these encounters as learning sources is dependent on an openness by practitioners to embrace new knowledge and a generosity of spirit within both cultures of practice.

Discussion of findings

Situated learning: context-specific learning, within practice - emerging theory.
The pathways of the six farmer case studies are summarised in conjunction with Figure 1.1. All six cases had early sociohistorical attachment and engagement in a farming community of practice; either on their family farm or on a farm of a relative or acquaintance. In all cases a strong attachment was formed, resulting in a sustaining love of farming and a dream of one day having the 'privilege' of owning a farm.

This study has identified a need for at least a temporary disengagement from farming to another context, for dispositional knowledge to develop from a broadened set of social practices. These practices may include other workplaces, tertiary education, travel, or a combination of experiences. This affords a *decision* to be made as an adult, to *choose* a career pathway, rather than simply fulfil social and familial expectations.

The success of the relationship of social co-participation between novice and master relies on commitment, legitimate sociocultural access and transparency. This relationship is reciprocal and requires a generosity of spirit. Those cases who either never experienced such a committed relationship, or who never disengaged to another context, became alienated from their community of practice and disengaged psychologically (Figure 1.1). This psychological disengagement limited learning, evolution of identity, and construction of dispositions. As a result they were disempowered, limiting motivation and the ability to construct an identity for mastery. These farmers remain lower performers.

There is an indication from this study that there may be a critical period for construction of dispositions for knowledge-use and identity for mastery. If the critical period is not fulfilled it may damage or limit development. Further research is needed to identify this critical period but anecdotal evidence was spoken of by Joe, when he recalled that, "(Old-timers) used to say that if a young farmer hasn't taken over the reins by 30 (years of age), then its too late - he won't succeed." This indicates that historically, a critical period was identified.

Those farmers, who disengaged from the direct pathway voluntarily and with a purpose in mind, were able to re-enter at a mature level with success. The levels of re-entry varied from partial to full participation. Those who were relative novices were able to accelerate learning with some evidence of transfer of associated knowledge, skills and

dispositions. With maturity and the propositional, procedural and dispositional knowledge constructed through their experiences, they learned through participating in a community of practice; within a culture of practice. Their experiences and maturity enabled ready sociocultural assimilation into the rural culture.

Historically, as emerging masters, both Joe and Colin were severely tested by climatic and financial adversity. Coping with such challenges was important in their evolving identity, learning and disposition. Over time they developed rich constellations of communities of practices enriching their knowledge base and enriching their practice. George and Ben, as emerging masters, are presently at the stage in their careers where they are being tested in their business choices and decisions. Full emergence to mastery depends on how they cope with both adversity and success.

A fully committed and reciprocal novice-master relationship, negotiated with full access to the social and cultural practice, is essential for successful guided learning or apprenticeship in everyday practice. There is an essential relationship between culture and cognition in contextual learning; everyday cognition (Rogoff, 1984).

Situated learning and dispositions

A common phrase used in agricultural education and training, is that farmers learn 'on the job.' Situated learning though, is not just being on the job (situated activity) but is a process involving commitment, transparency and generosity, in providing legitimate access to the sociocultural community of practice. People do not learn by a form of osmosis, from simply being there but actively construct knowledge through engagement and social interaction.

Those cases who grew up on farms, developed socioculturally to *legitimate peripheral participation* level (Figure 1.1) and at times to become *partial participants*. Those who remained continuously involved on their family farms struggled to move to *full membership*. There is a common experience in those cases where the father as employer, limited access to *full participation* (probably unconsciously), by exercising control over the participatory level of the son's involvement. There was a lack of transparency, a lack of empowerment and a lack of attenuating conditions. This appears to have led to a loss of learner motivation due to truncated learning. Lack of identity towards mastery and limited dispositional ability for progressive knowledge, limited the learner's ability to *construct* and *use* new knowledge.

The result for these two farmers as young men (Max and Henry), was to disengage psychologically while remaining on the family farm. It is unclear what their role was in the farming enterprise but it appears to have resembled "an extra pair of hands." It lacked progressive responsibility and management decision-making. As a result, these farmers have struggled to farm throughout their careers, both being lower performers, farming mainly for "the lifestyle." This supports what Lave (1991) sees as a prolonged delay from peripheral to full participation (Figure 1.1) resulting in separating identity from knowledgeable practice.

Constructing knowledgeable identities

Those farmers who never grew up on farms, along with those who left their family farms either to work at other workplaces or to pursue tertiary education and travel, developed into 'rounded' people. They experienced increased responsibilities, evolving

disposition and a '*kind of knowing*' (Schön, 1983) through practice. These largely dispositional abilities, enabled their mature entry or re-entry to farming at, or approaching, full membership level (Figure 1.1). They demonstrated some transfer of knowledge and an ability to rapidly construct the knowledge required. Through their off-farm experiences, they had learned how to learn, and developed the dispositions

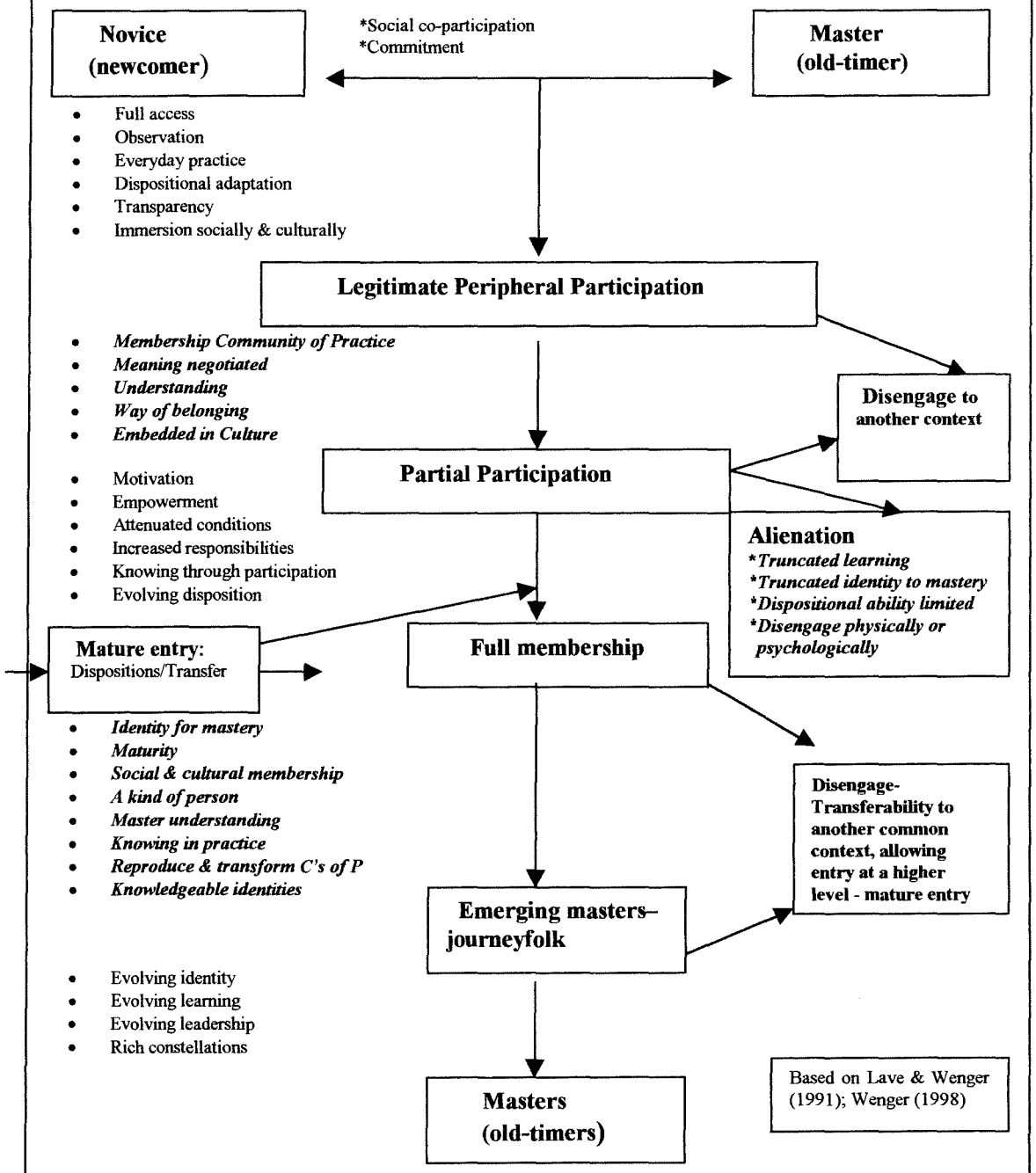

Figure 1.1 Situated learning: context-specific, guided learning within sociocultural communities of practice.

required to construct and use knowledge; they had developed *knowledgeable identities*. This knowledgeable identity, combined with a wide range of dispositions and maturity, allowed for a rapid pathway to sociocultural membership and an identity for mastery.

They became 'a kind of person' (Lave & Wenger, 1991) with an ability for understanding, which led to emerging mastery.

Dispositions, thinking and practice for mastery
The two masters in this study (Joe & Colin) have experienced the highs and lows of practice, requiring the full range of higher-order propositional, procedural and dispositional knowledge. They display the full range of dispositions identified in this study as essential for rigorous thinking and rigorous practice in higher performing practitioners. Throughout adversity they have had to be resilient and resourceful, often making challenging decisions and taking substantial but calculated risks. Through a formal process requiring open-mindedness, critical analysis and a need to challenge their beliefs, they have kept ahead of the fast pace of changing technology and subsequent practice. They have maintained and extended their mastery through continually evolving dispositions, identity, learning and leadership.

Resource-rich constellations of communities of practice
While George and Ben (emerging masters), have yet to prove themselves as masters, they are on the journey and have the ability to progress to that advanced level. Both the masters and emerging masters in this study have developed resource-rich constellations of communities of practice, which they are continually extending through practice and social interaction. In parallel, they are continually evolving through practice their higher-order propositional, procedural and dispositional knowledge.

The lower performers in contrast, exercise lower-order knowledge and resource-poor constellations of communities of practice. They rely strongly on historical and local knowledge learned from their fathers and others who influenced them in their early years. In critical incidents, they refer regularly to currently following practices learned at a time when farming was a protected industry; vastly different from present day practice. They have not kept pace with agricultural technology and have not made the transition to modern farming practice. These practitioners have not made the change in attitude required to farm successfully in today's political and economic climate.
Due to their extensive and advanced dispositional knowledge, the higher performing farmers (masters and emerging masters) have the ability to move with fluidity in constructing higher-order knowledge either from a propositional base or from a procedural base. In contrast, the lower performers favour lower-order procedural knowledge; the more routine tasks. This preference appears to be due to their lack of dispositional ability.

While expertise depends on a convergence between experience and competence, innovative learning requires their divergence (Wenger, 1998). The lower performing farmers lack the dispositional ability to move outside their comfort zone and to take the associated risks for innovation, while the higher performing farmers in contrast, enjoy this challenge If the practitioner hasn't the disposition to move outside their comfort zone, over time their expertise becomes obsolete as it is not maintained or revitalised.

Emergent Theory
From inductive research of the personal histories and practice of six farmers as case studies, emergent, grounded theory suggests that dispositional knowledge underpins construction and use of all knowledge. It indicates that construction and use of higher-order propositional and procedural knowledge requires higher-order dispositional

knowledge and that mastery is developed through evolving identity, dispositions, leadership and learning, socioculturally constructed through resource-rich constellations of communities of practice.

Conclusion

Qualifications or lack of the same are no indication of knowledge, ability or performance in practice. Both those higher performers with and without qualifications have exercised a formal, focused pathway to constructing higher-order knowledge in practice. This present research explored the experiences and practice of six farmers, identifying learning-rich and learning-poor characteristics and the need to emphasise a learning paradigm for mastery in the 21st Century. It challenges assumptions that farming is not *knowledge work*. It argues that performance and knowledge exist in parallel as *knowing in practice*, which is reflected in the practitioner's level of performance.

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